EXPLAINING PUBLIC SUPPORT FOR CLIMATE CHANGE MITIGATION POLICIES – A CASE STUDY OF AUSTRALIA

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DECLARATION

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

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Hieu Dinh Ha

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RELATED PUBLICATIONS

Peer-reviewed Journal Articles

- Hieu Dinh Ha & Rajendra Mulye 2015, 'Explaining public support for climate change mitigation policies – An analytical framework', *World Journal of Management*, vol. 6, no. 1, pp. 201 – 222

Working Papers

- Hieu Ha & Rajendra Mulye 2015, 'The role of perceived policy effectiveness in Australian climate change believers' support for mitigation policy – A test of mediating hypothesis'
- Hieu Ha & Rajendra Mulye 2015, 'Putting experts into lay people's shoes – What drives climate scientists to support climate change mitigation policies?'

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LIST OF ABBREVIATIONS

AC	Adverse Consequences (the Value – Belief – Norm model)
CCB	Climate Change Believer
CSIRO	Commonwealth Scientific and Industrial Research Organisation
df	Degree of freedom
EFA	Exploratory Factor Analysis
EPPM	Extended Parallel Process Model
KAB	Knowledge - Attitude – Behaviour model
OECD	Organisation for Economic Co-operation and Development
PA	Perceived anthropogenic causes of climate change
PCA	Principal component analysis
PE	Perceived effectiveness of climate change mitigation policies
PE-BEH	Perceived effectiveness of behavioural climate change mitigation policies
PE-STR	Perceived effectiveness of structural climate change mitigation policies
PF	Perceived feasibility of climate change mitigation policies
PF-BEH	Perceived feasibility of behavioural climate change mitigation policies
PF-STR	Perceived feasibility of structural climate change mitigation policies
PI	Perceived adverse impacts of climate change
PI-HICR	Perceived high-critical adverse impacts of climate change

PI-LOCR	Perceived low-critical adverse impacts of climate change
PI-SEA	Perceived adverse impacts of climate change - Sea-level rises
PI-WEA	Perceived adverse impacts of climate change - Extreme weather
PI-WEB	Perceived adverse impacts of climate change on human wellbeing
PS	Support for climate change mitigation policy
PS-BEH	Support for Behavioural climate change mitigation policy
PS-STR	Support for Structural climate change mitigation policy
RPA	Risk Perception Attitude
S.E.	Standard Error
TPB	Theory of Planned Behaviour
VBN	Value - Belief - Norm model

THESIS ABSTRACT

Climate change is one of our major contemporary challenges, and public support for climate change mitigation policies is essential to tackle this issue. It is generally agreed that public support for mitigation policies is driven by individuals' beliefs in adverse impacts of climate change and their anthropogenic causes. However, there have been instances where strong beliefs in these two factors have not yielded full public support for mitigation policies, especially tough initiatives, such has been the case with Australia's carbon tax. Exploring missing determinants of public support for mitigation policies remains a challenge for both policymakers and scholars. Furthermore, it has been argued that communications about climate change issues are nonlinear leading to information distortion when transferred from climate scientists to lay audiences thereby widening the attitudinal gaps between the two groups. Identifying theses gaps is important in order to more effectively communicate climate change information and therefore enhance mitigation efforts.

This thesis focuses on four constructs of perceived adverse impacts of climate change, perceived anthropogenic causes of climate change; perceived policy effectiveness, and feasibility to explain Australian public support for mitigation policies. The study draws from major theories in the field such as the Theory of Planned Behaviour, Risk Perception Theory, the Extended Parallel Process Model, and Social Dilemma literature. Examining field-surveyed samples of 1,476 general public participants, and 140 climate scientist participants, the study reports important findings to enhance understanding of factors that lead to policy support.

This thesis found that perceived policy effectiveness plays a critical and complex role than previously thought and moderates the influence of perceived adverse

impacts of climate change on supportive behaviour. Participants are unlikely to support a mitigation policy just because they are aware of possible adverse impacts of climate change, they would also consider policy effectiveness as the key factor in deciding whether they should sacrifice their immediate self-interests to mitigate climate change. It was also found that over-communicating adverse impacts of climate change may reduce the positive impact of perceived policy effectiveness on public support.

Moreover, the study found many significant differences in perceptions of the adverse impacts of climate change, and in evaluations of mitigation policies when contrasting the general public with climate scientist. These gaps were argued to be linked to differences between the two groups in their mitigation policy preferences. Moreover, data from the sample of climate scientists, who are assumed personal and/or political interests bias-free, endorses the dominant role of perceived policy effectiveness. They also have a preference for mandatory initiatives to mitigate prolonged and implicit impacts of climate change, such as sea-level rises.

In conclusion, this thesis suggests that perceived policy effectiveness is the key to public support for climate change mitigation policies, although common drivers such as perceived adverse impacts of climate change should not be ignored. Future research in the field of pro-environmental behaviour, and climate change communication campaigns should place more considerations to the construct of perceived policy effectiveness.

Keywords: Climate Change Mitigation Policy; Policy Support; Perceived Policy Effectiveness; Perceived Adverse Impacts of Climate Change; Australia

CHAPTER ONE

INTRODUCTION

1.1 Climate Change and Australia

Climate change is predicted to have significant impacts on Australia. Warnings about these impacts were raised by the Commonwealth Scientific and Industrial Research Organisation's (CSIRO) as early as the 1980s with presentations of a number of climate change scenarios and their adverse impacts on society, the economy and the biosphere (Burgmann & Baer 2012). More recently, in their report 'Climate Change: Science and Solutions for Australia', the CSIRO confirmed that climate change will have dramatic impacts on many important areas, including Australia's water supply, coastal development, biosphere, and human health (Hennessy 2011). This conclusion is important because the public's perception of the adverse impacts of climate change is shaped by such reports which are key drivers of their willingness to engage in mitigation actions (Bostrom et al. 2012; O'Connor et al. 2002; O'Connor, Bord & Fisher 1999; Sibley & Kurz 2013). The following section therefore briefly details some of the adverse impacts of climate change reported in the scientific media and general press in Australia.

In term of water supply, Hennessy (2011) claims that the water supply in Australia's southern and eastern regions will decrease if atmospheric temperature continues to increase at the current rate. This will not only affect water supply to households in Australia's two most populous states, New South Wales and Victoria, but also

adversely impact the agricultural sector (Parry 2007). This is critical because agriculture is among the most water-intensive production sectors in Australia accounting for 59% of Australia's total water consumption in 2011 and 2012 (Australian Bureau of Statistics 2013). Moreover, agricultural products are among the top 20 Australian export commodities and related services (Department of Foreign Affair 2012). Therefore, climate change related water supply reductions have the potential to harm livelihoods and the nation's agricultural output and revenue.

Sea-level rises are another major concern, and will heavily impact Australia's low lying coastal areas and islands. The Department of Climate Change (2009) predicted that 22% to 34.8% of 711,000 coastal residential buildings nationwide will be at risk should sea-levels rise by 1.1 m, with an estimated financial loss between $41 to $63 billion. The report stated that sea-level rises would also impact future economic and infrastructure development of coastal areas.

The adverse impacts of climate change on biodiversity are the result of increases in atmospheric temperatures and sea levels. The associated consequences are predicted to eliminate several unique Australian species and habitats (Hennessy 2011). Coastal ecosystems, such as coral reefs, are important biodiversity reservations and are particularly vulnerable to the effects of climate change. Should the atmospheric temperature rise by two degrees Celsius by 2100, the Great Barrier Reef will change its profile from a coral-dominant to algal-dominant habitat, significantly reducing biodiversity (Department of the Environment and Heritage 2003, p. 19). The damaging impact of increases in sea temperatures to the Great Barrier Reef was already seen in 2002, with more than half of the area effected by "coral bleaching"

which reduces coral growth and reproduction (Department of the Environment and Heritage 2003, p. 16; Marshall & Schuttenberg 2006). In economic terms, the $5 billion-a-year tourism industry generated by coral reef tourism is also at risk from this degradation (Hennessy 2011).

Finally, it is the impact of climate change on health that possibly attracts the most community attention. Direct adverse impacts are caused by heat waves, floods, fires and storms and indirect impacts are the result of changes to biological and ecological systems (Hennessy 2011). Several diseases and medical conditions are assumed to be associated with climate change, such as heat stroke, heart attack and infectious diseases. In 2003, McMichael et al. predicted that should the temperature increase by two degrees Celsius by 2050, the risk of heart-related deaths for over-65 years olds in Melbourne, Sydney and Brisbane would increase between 57% and 164% compared to what was in 1999. Similarly it is predicted that epidemics of infectious diseases such as malaria, dengue fever, and diarrhoea would be experienced on a national scale due to climatic shifts (McMichael et al. 2003).

In summary, there is enough evidence to suggest that climate change will harm Australia's economy, biodiversity and the wellbeing of the community. These important aspects of the nation's development are at threat when faced with an atmospheric temperature increase of two degrees Celsius by 2050. Australia's coastal-oriented development and dry weather amplifies the adverse impacts of climate change. It is also argued that climate change will seriously harm human health. Many factors required to maintain human wellbeing, such as water and food security, will be adversely affected and it is likely that heat stroke and infectious disease epidemics will occur. Therefore, there is a need for adaptation strategies to

assist the community to adjust to these conditions. However, adaptation strategies are insufficient in the long-term unless climate change mitigation policies, such as for greenhouse gases emission reductions, are also put in place (Agrawala et al. 2014).

1.2 Public Opinion on Climate Change and the Political Climate Actions in Australia

The Australian public has engaged with scientific evidence of human-induced climate change and its adverse impacts. Research in the early 1990's showed that 90% of Australians were aware of the significance of environmental issues, including climate change (Burgmann & Baer 2012). Later public surveys confirm that the majority of citizens perceive climate change as a critical threat. For example, the Lowy Institute survey of 1,000 Australians in 2007 found that 86% of participants ranked climate change as the most critical threat, ahead of international terrorism and nuclear weapons (Gyngell 2007). Similarly, the latest report from the Climate Institute confirms that 70% of Australians are "climate change believers" who 'accept that climate change is occurring', that 84% agree that human activity is a partial cause of climate change, and 89% of "climate change believers" think that the country is suffering its adverse impacts (Stefanova 2014, p. 3).

High public awareness of climate change is likely to be linked with a desire for timely action from government. Burgmann and Baer (2012) cited a 1989 Saulwick poll that recorded nine out of ten Australians demanding urgent action from the government on global environmental issues. Annual studies from the Lowy Institute suggest that Australians have recognised the global importance of climate change

actions, have been willing to undertake cost-induced actions, and want their government to take leadership on this issue, regardless of international consensus (Cook 2006; Hanson 2008, 2009, 2010, 2011; Oliver 2013, 2014). Similarly, the Climate Institute in 2008 found that 76% of the public expected the Australian government to be a leader in climate change actions (Stefanova 2014).

Public support is essential for climate change policy development, especially in the context of democratic countries such as Australia (Moser 2010b). It can be argued that this public support led to the Australian Government's 1990 adoption of the Toronto Target to reduce carbon emissions by 20% by 2005, the establishment of the National Greenhouse Response Strategy in 1992, and Australia's ratification of the Kyoto Protocol in 2007, which set a target to reduce carbon emissions by 60% on 2000 levels by 2050 (Anita, Simeon & Kate 2013). Burgmann and Baer (2012) argue that it was the public' awareness of climate change that lead to the change of government during "The World's First Climate Change Election" in Australia in 2007. The Liberal/National Coalition led by Prime Minister John Howard lost government to the Labor Party (ALP), lead by Kevin Rudd, due in part to the Australian public's rising awareness of climate change issues at the time (Burgmann & Baer 2012). According to Burgmann and Baer (2012), the ALP was perceived as being more committed to climate change intervention than the Coalition. More generally, Australia's pioneering climate change policy 'has been a polarising and highly political issue' (Anita, Simeon & Kate 2013, p. 1), and a result of the contradiction between the general public's demand for climate change action and neoliberalism (Andrew, Kaidonis & Andrew 2010; Burgmann & Baer 2012; Spash & Lo 2012).

One of the recent climate change issues in Australia is the abolition of the carbon tax under the current Liberal/National Coalition Government lead by Prime Minister Tony Abbott. In the 2013 Federal Election, the carbon tax was a policy battleground, with the Coalition government establishing a policy position of abolishing carbon pricing. However, the abolition of the carbon tax seems to have not been central to the election success of the Coalition. An Exit Poll Report released by the Climate Institute in September 2013 demonstrated that only three per cent of Australians considered the abolition of the carbon tax as influencing votes but instead, that effective economic policies were more persuasive. Moreover, the Exit Poll Report suggested that 63% of the voting public believed in the existence of climate change and nearly half expected the new government to maintain carbon pricing (Connor & Stefanova 2013). It could be argued, therefore, that the abolition of the carbon tax does not necessarily mean that the Australian public are less likely to believe in the effects of climate change, or that they rejected mitigation policies. Indeed, according to 2014 research, only 41% of the public believed they were negatively affected by carbon pricing (Climate Institute 2014). What constrains the public's full support for the carbon tax, perhaps then, is the way that the previous Australian government designed and implemented that initiative and other carbon trading schemes. According to Spash and Lo (2012), the government had been spending taxpayer's money on 'buying-off the coal generators or other polluters' (p 67), which is less likely to curb carbon emissions effectively. This may have also impacted on the public's willingness to make the financial sacrifices that carbon pricing requires.

However, there have been fluctuations in Australians' support for climate change action. According to the Lowy Institute annual polls, in 2006, 68% of Australians were willing to accept increased financial costs to mitigate climate change, but by

2009 that number had dropped to 48% and in 2014, only 45% of the public supported mitigating actions (Oliver 2014). The Climate Institute reported similar patterns between 2008 and 2014. In 2008, 76% of participants supported Australia's leading role in combating climate change globally, however, by 2010, the number had decreased to 55%, and further declined to 52% in 2012. Although the Australian public's support for climate change action then increased to 61% in 2014, it is still below the 2008 (76%) record (Stefanova 2014).

The increases and decreases in public support for climate change actions are the result of many factors. Although the public expects government to respond to a complex and diverse range of issues, such as the national economy, job creation, welfare, national security, immigration, refugee and asylum seekers and nuclear risks, climate change has remained an ongoing concern (Cook 2006; Gyngell 2007; Hanson 2008). However, changes in international and domestic circumstances affect the ranking of climate change issues and accordingly, impacts on public support for climate change related policies. Furthermore, this thesis proposes that an important influence on public support for climate change mitigation policies is the effectiveness of these policies in reducing carbon emissions, and therefore their effectiveness in climate change mitigation.

Burgmann and Baer (2012) argue that public support for ALP's policy to reduce carbon emissions was the platform upon which it won the 2007 Federal Election. The Lowy Institute recorded that in 2006, 68% of Australians supported climate change mitigation action even with significant personal costs. However, the willingness of the public to support climate change actions was likely to decrease after the Rudd Government proposed the Carbon Pollution Reduction Scheme (CPRS). The CRPS

proposed a modest carbon emission reduction target of between five and fifteen per cent of 2000 levels by 2020, which was perceived as inadequate to mitigate harmful impacts of climate change (ABC News 2008; Australian Science Media Centre 2008). By 2010, after the CPRS was rejected twice in 2009, only 48% of the public supported climate change mitigation action (Australian Government 2010; Cook 2006; Hanson 2010). Thereafter, Julia Gillard seceded Kevin Rudd as Prime Minister and introduced the Clean Energy Plan (CEP) which paved the way for a carbon tax in 2011 (Gillard 2011). Again, the CEP and Carbon Tax were criticised for their low effectiveness in carbon emission reductions. The way these initiatives were designed and implemented was unlikely to encourage industries, especially electric producers, to reduce their carbon footprints. Big polluters were freely allocated carbon permits and were allowed to sell unused emission permits at a fixed price (Spash & Lo 2012). This violates the economic basis of carbon pricing tools, which suggests that carbon emissions should be traded at market-based prices (Garnaut 2008). Free carbon permits, and the fixed-price trading scheme actually gave incentives to big polluters to not reduce carbon emissions, and to transfer the carbon tax-induced costs to consumers (Burgmann & Baer 2012; Spash & Lo 2012). The Australian public in fact expressed their disfavour towards the CEP and the carbon tax, with only 36% of Australians prepared to accept personal financial costs to support climate change actions (Hanson 2012). In 2012, the lowest community support for climate change mitigation policies and Australia's global climate change leadership was recorded (Stefanova 2014).

In summary, it is predicted that climate change will have significant impacts on Australia's development. The underlying factors driving Australians' support for government actions are the general public's high awareness regarding the adverse

impacts of climate change. Unfortunately, beliefs in the existence of human-induced climate change, and in its adverse impacts, seem to be insufficient to maintain the Australian public's support for tough mitigation policies, such as the carbon tax. It was also observed that the public's support for mitigation actions varied with the introduction of the nation's carbon emission reduction programs such as Rudd's CPRS, and Gillard's CEP and the carbon tax. Moreover, these policies were criticised by many experts for their low effectiveness in carbon emission reductions as these policies either aimed for inadequate carbon reduction targets (CPRS), or were watered-down (CEP).

In fact, according to recent report from the United Nations Environment Programme (UNEP 2014), Australia is unlikely to reach its Kyoto Protocol pledge, which was to reduce carbon emissions by five per cent of 2000 levels by 2020. In addition, the Climate Change Authority (2014) has argued that the five-per-cent reduction target is inadequate to ensure Australia's fair contribution to the international agreement of limiting global warming below two degrees Celsius, and that a target of at least 15% below 2000 levels would be better. The Authority also argued that further delay in actions on curbing carbon emissions will place heavier burdens on the next generations of Australians, given the nation's international commitment to climate change issues. However, in order to take stronger actions on climate change issues, policymakers would face the challenge of garnering public support. This is critical in any democratic context, although one may observe that climate change issues in Australia have been 'highly political' (Anita, Simeon & Kate 2013, p. 1).

1.3 This Thesis

Climate change is among one of our most challenging contemporary issues and requires immediate actions on a global scale (Stern 2006). Accordingly, many nations have actively undertaken mitigation actions (Edenhofer et al. 2014), the success of which has relied on public support for climate change mitigation policies. Consequently, studying the drivers of public support for climate change mitigation policies is necessary in both a theoretical and practical context. The focus of this thesis therefore is to investigate public support behaviour towards climate change mitigation policies.

Australia provides a good context for this study because it is amongst the highest emitters of carbon pollution per capita, compared to other OECD countries and the world average (Garnaut 2008), and the nation because of its geographic position, faces significant risk from climate change. Furthermore, a majority of Australians are climate change believers who are likely to accept the existence of human-induced climate change and of its adverse impacts (Hine et al. 2013; Leviston, Walker & Malkin 2013). The literature suggests that these two beliefs are among significant drivers of public support for mitigation initiatives (Bostrom et al. 2012; O'Connor et al. 2002; O'Connor, Bord & Fisher 1999; Sibley & Kurz 2013). Unfortunately, Australian governments have struggled to transform the general public's high awareness of climate change issues into support for tough mitigation initiatives. The carbon tax, for instance, was introduced in Australia in 2012 and expected to be a vehicle for attaining the nation's ambitious carbon emissions reduction target. Yet it received inadequate public support and was recently abolished (Connor & Stefanova 2013).

There has been much discussion in the scientific community and the general press on this policy reversal with many experts criticising the initiative for its low effectiveness in curbing carbon emissions (Australian Science Media Centre 2008; Burgmann & Baer 2012; Climate Change Authority 2014; Lo & Spash 2012; Spash & Lo 2012; see more expert opinions at ABC News 2008). These discussions, it can be argued may have had significant effects on the general public perceptions of the effectiveness of the carbon tax as a way of curbing climate change as scientists are considered as the most trusted source of climate change information (Buys et al. 2012; Leviston & Walker 2011b). Consequently, even though the general public's opinions regarding climate change issues may be clouded by media reporting, political campaigns, and business sector (Weingart, Engels & Pansegrau 2000), their perceptions of mitigation policy effectiveness will also be influenced by expert opinions. That is, to some extent, the general public may be able to judge the actual effectiveness of the governments' mitigation policies. This assumption, the history of Australian climate change movements, and the importance of perceived policy effectiveness to individuals' opinions regarding public policies (see Lubell 2003; Wan & Shen 2013), make it possible to hypothesise that perceived policy effectiveness may be an important missing piece in the puzzle of stimulating public support for mitigation policies. Despite this, the literature describing pro-environmental behaviours barely examines this promising determinant of support behaviour towards mitigation initiatives.

This thesis therefore centres around two determinants: perceived adverse impacts of climate change, and mitigation policy effectiveness. This thesis aims to utilise these two determinants, together with other important factors such as perceived anthropogenic causes of climate change, and perceived policy feasibility, to explain

public support for climate change mitigation policies. The study also investigates attitudinal gaps between the general public and climate scientists. In particular, it focuses on differences in the lay and scientific communities' perceptions of climate change, climate change mitigation policies, and support levels for those policies, to identify evidence of nonlinearity in climate change communication (Stoutenborough & Vedlitz 2014; Weingart, Engels & Pansegrau 2000). It is suggested that this may contribute to our understanding of the public's reluctance to support climate change mitigation policies.

In order to fulfil the above research objectives, this thesis proposes the following five research questions:

- **Research Question One:**

  What drives public support for climate change mitigation policies?

- **Research Question Two:**

  Compared to perceived adverse impacts of climate change, what role does perceived policy effectiveness play in driving mitigation policy support behaviour?

- **Research Question Three:**

  To what extent do the determinants of the support behaviour influence each other when explaining the identified behaviour?

- **Research Question Four:**

  What are the differences between the general public and climate scientists in attitudes towards climate change, evaluation of climate change mitigation policies, and support for them?

- **Research Question Five:**

  What drives climate scientists' support for climate change mitigation policies?

The next five chapters investigate the above research questions. They are titled as follows:

- **Chapter Two**

  Explaining public support for climate change mitigation policies – An analytical framework

- **Chapter Three**

  What drives public support for climate change mitigation policies? – Empirical evidence from the Australian general public

- **Chapter Four**

  Explaining public support for climate change mitigation policies – Identifying the "gatekeeper" and why "less is more only when more is too much"

- **Chapter Five**

  Putting experts into lay people's shoes – What drives climate scientists' support for climate change mitigation policies?

- **Chapter Six**

  Conclusion

Chapter Two synthesises the relevant literature on pro-environmental behaviours and proposes an analytical framework. This chapter helps theoretically identify the

determinants that generate public support behaviour towards climate change mitigation policies, and the mechanisms by which these drivers explain behaviour (*Research question one*). The analytical framework proposed in Chapter Two is then empirically tested through a field-survey sample of the Australian general public, as described in Chapter Three and Chapter Four. Chapter Three focuses on the direct influences of the identified determinants of public support for climate change mitigation policies (*Research question two*). Chapter Four investigates mediating and moderating mechanisms through which the determinants explain the support behaviour (*Research question three*). Chapter Five then contrasts the general public group with a sample of Australian climate change scientists to identify some attitudinal gaps (*Research question four*). This Chapter also tests the analytical framework developed in Chapter Two on the assumed bias-free sample of climate scientists (*Research question five*). This enabled the development of an enhanced model for stimulating support for climate change mitigation initiatives. Chapter Six describes and discusses the findings and validates the thesis' research questions.

CHAPTER TWO

EXPLAINING PUBLIC SUPPORT FOR CLIMATE CHANGE MITIGATION POLICIES – AN ANALYTICAL FRAMEWORK

2.1 Overview

The literature has identified many important drivers of climate change mitigation policy support behaviour (PS), such as perceived adverse impacts of climate change (PI) and perceived policy effectiveness (PE). Although the role of the former has been well-examined, the literature has largely ignored the mechanism by which PE drives PS. In addition, even though the literature warns against the over-use of PI in climate change communication, commonly known as the "fear appeal" approach, an explaining theoretical framework is seldom provided. Moreover, the literature also neglects the extent to which the fundamental characteristics of mitigation initiatives affect policy preferences. This limitation derives from inadequate examination of the nature of the policies, as well as the deeper factorial structures of the behaviour's determinants. Synchronising the Social Dilemma literature with major theories in the field such as the Theory of Planned Behaviour, the Risk Perception Theory, the Extended Parallel Process Model, and the Risk Perception Attitude framework, this chapter proposes an analytical framework that helps explain the variation in PS across climate change policies' characteristics. The framework also suggests a mediating mechanism through which PE drives PS, and a moderating perspective,

which may help theoretically verify the "fear appeal" caution. Finally, this study suggests that in addition to effectiveness, perceived policy feasibility should be included as an important aspect of individuals' policy evaluation to explain PS. Discussions and further research suggestions are also offered.

2.2 Introduction

Australian's national science agency, the CSIRO have predicted that climate change will significantly impact Australia's economic and biophysical environment (Cleugh et al. 2011). These adverse predictions have prompted the government to take a wide range of mitigation actions to reduce factors believed to contribute to climate change. One such initiative was to set a target of a reduction in carbon emissions by 15% below the 2000 level by 2020 (Australian Government 2008). To achieve this goal the government introduced the carbon tax at 23 AUD per tonne of carbon emissions, effective from 1st July 2012 (Gillard 2011). In addition, education and incentive programs such as the "Clean Energy Future" have been implemented to help households and businesses reduce their power consumption and provide financial incentives to buffer them against higher power bills emanating from introduction of the carbon tax.

Despite these comprehensive government actions, there is still controversy around what the appropriate policies are to mitigate climate change impacts. Taking the carbon tax for instance, the general public support for the policy has been limited. One month following implementation of the carbon tax and financial support packages, only 36% of Australian public were found to support the carbon tax while

59% opposed it. (Nielsen 2012). The carbon tax was abolished in July 2014. A similar trend was also found in the US where consumers opposed energy taxes (Leiserowitz 2006). Nevertheless, the public's engagement in climate change mitigation is important as they contribute to two of the largest sources of carbon emissions, either directly by fossil fuel combustion or indirectly by electricity usage (Australian Government 2008; Stern 2006). The lack of support from this important stakeholder in combating climate change is therefore problematic and consequently, the topic of explaining consumer support for climate change mitigation policies is relevant to both policy and academic research.

This research topic, which belongs to a more general area of pro-environmental behaviours (PEBs), has attracted researchers from many areas, including psychology (Aguilar-Luzón et al. 2012; Gifford 2011; Kaiser, Hübner & Bogner 2005; Stern et al. 1995), sociology (Bostrom et al. 1994, 2012; Moser 2010a; O'Connor et al. 2002; O'Connor, Bord & Fisher 1999; Stern 2000), as well as marketing (Berger & Corbin 1992; Hutton & Ahtola 1991; Moser 2010a; Press & Arnould 2009; Prothero et al. 2011; Wiener & Doescher 1991). There is a general agreement in the literature that the level of public support for climate change mitigation policies is influenced by the public's perceptions of the adverse impacts of climate change on their and other society members' quality of life, as well as on the biosphere (Bostrom et al. 2012; Fransson & Gärling 1999; O'Connor et al. 2002; O'Connor, Bord & Fisher 1999). However, the literature has largely ignored the underlying structure which forms the basis of the general public's perceived adverse impacts of climate change and its relation to their support of specific climate change mitigation policies.

The perception of policy effectiveness is considered another important factor when examining individuals' support for public policies in general (Lubell 2003). Consequently, many works in the field of environmental psychology have investigated the concept of perceived policy effectiveness, especially in the context of transportation and energy policies (see Steg, Dreijerink & Abrahamse 2006; Steg & Vlek 2009). In fact, perceived policy effectiveness and policy acceptability (i.e., policy support) seem to go hand-in-hand in research on public opinion of transportation policies (Stead 2008). However, according to Steg and Vlek (2009), most of the studies investigating perceived policy effectiveness aim to explain factors which help establish that aspect of policy evaluation. For instance, Steg et al. (2006) investigated the role of individual attitude and preferences, characteristics of energy use policies in determining the policies' perceived effectiveness. There is, however, limited study on the link between perceived policy effectiveness and intentional or behavioural change. Indeed recently, Wan and Shen (2013) urged for greater attention to be paid to the concept of perceived policy effectiveness as an important component driving PEBs. Wan et al. (2014) found empirical evidence suggesting that the construct positively drives recycling behaviour when examining a sample of 198 Hong Kong residents. Moreover, perceived policy effectiveness was also found to moderate the effects of common attitudinal determinants on PEBs, such as subjective norms (Wan, Shen & Yu 2014a). However, in the context of mitigation policy support behaviour, there is only limited empirical evidence highlighting the role of perceived policy effectiveness. Furthermore, the literature rarely is able to clarify the mechanism through which policy effectiveness drives the support behaviour (e.g., Bostrom et al. 2012).

In addition, we know little about the influence of perceived policy effectiveness on other key drivers of climate change policy support, such as the perceived adverse impacts of climate change. Addressing this gap will provide insights into cases of failed climate change policies, such as the Australian carbon tax. Many surveys indicate that a substantial portion of Australians are concerned about the damaging impacts of climate change on their livelihood and the country's economy (Leviston & Walker 2011a, 2011b; Leviston, Walker & Malkin 2013). However, the carbon tax was still scrapped partially due to low perceptions of the effectiveness of the policy in reducing carbon emissions (Hannam 2014). It is possible that the low perceived policy effectiveness restrains the stimulating effect of perceived adverse impacts of climate change on policy support. Therefore, it is suspected that perceived policy effectiveness, and other key determinants of public support for mitigation policies, may not independently explain their dependent variable.

The aim of this chapter therefore is to address these gaps in the literature by proposing a model to explain the general public's support for climate change mitigation policies. The chapter draws upon three diverse theories of movement support, the Theory of Risk Perception, the Theory of Planned Behaviour and the Social Dilemma literature, to identify key constructs that are relevant to the problem of gaining public support for climate change mitigation policies. Moreover, this chapter employs the Extended Parallel Process Model (EPPM) and the Risk Perception Attitude (RPA) framework to propose a mediating and moderating perspective in explaining mitigation policy support. The chapter starts by first defining the PS construct and exploring its available measures. Next the chapter introduces an integrated model of policy support and describes its theoretical foundation, followed by a set of propositions that arise from the model. Finally the

chapter suggests an enhanced model by taking into consideration factorial structures of the constructs in question.

2.3 Literature Review

2.3.1 Definition of climate change mitigation policy support behaviour (PS)

Rarely has a formal definition of PS been provided in the literature. Instead, PS often borrows the definition of environmental policy support behaviour suggested by Stern et al. (1999) and Stern (2000). In these seminal works, the behaviour of environmental policy support is profiled as one of the four possible aspects of pro-environmental behaviours (PEBs) (Stern 2000; Stern et al. 1999). Individuals who support environmental policies, which includes climate change mitigation policies, are characterised as "non-activist" environmentalists who are willing to sacrifice their own interests for the sake of the natural environment (Stern 1999, 2000; Stern et al. 1999). Nevertheless, the complexity in the nature of climate change mitigation policies makes this general definition of environmental support behaviour difficult to apply in this context, as not all climate change mitigation policies require followers to sacrifice their interest. Government subsidises for solar energy systems that aim to encourage consumers to switch to non-fossil energy sources is one such example.

This study defines PS as the voting behaviour and voting intention of the general public towards the government's stance on climate change mitigation. This definition distinguishes climate change mitigation policies from general environmental policies by defining them as policies that aim to mitigate the impact of climate change as

communicated or promised by the government (O'Connor, Bord & Fisher 1999). As climate change mitigation policies may consist of current policies, for example the carbon tax in case of Australia, and those policies that are still under development, this study does not distinguish between actual behaviour (for already-employed policies) from behavioural intention (for policies in development) when examining the PS construct. The close positive linkage between actual behaviour and behavioural intention, as postulated by the Theory of Planned Behaviour (Ajzen 1991), provides the rationale for this assumption.

2.3.2 Limitations of current available measures of PS

Compared to other aspects of PEBs, the research on environmental policy support and measures of PS in particular is limited. This section reviews some available measures of the PS construct to indicate possible gaps in the literature in measuring this important construct.

If PS is positioned in the bigger picture of general environmental policy support behaviour, it is possible to employ current available measures of general environmental policy support behaviour to measure the PS construct. The research done by Stern et al. (1999) looks closely at environmental policy support behaviour of the general public. The authors measured environmental policy support, which was labelled as "Policy Support" in their VBN model, by the following three items:

- 'I would be willing to pay much higher taxes in order to protect the environment'

- ‘I would be willing to accept cuts in my standard of living to protect the environment’

- ‘I would be willing to pay much higher prices in order to protect the environment’

It could be argued that these three items might be measuring individual “willingness to sacrifice” or “willingness to pay” for protecting the environment - a function of a person’s financial situation, rather than her willingness to support an environmental policy. Furthermore, Stern et al. (1999) did not examine any specific set of actual policies in operationalising their “Policy Support” construct. This affects the content validity of the construct, as it attempts to measure the policy support behaviour of the general public using the concept of “willingness to pay” without any specific economic cost. For instance, individuals might be willing to pay higher taxes to mitigate climate change effects, however, they may not support the carbon tax if they face a specific increased cost in their electricity bills.

Apart from the construct validity issues with the measure suggested by Stern and his colleagues, this measure of general environmental policy support, indeed the general “willingness to sacrifice” for the sake of the environment, might not be suitable for measuring the PS construct for other reasons. First, the measurement of a “willingness to sacrifice” in relation to general actions, rather than a specific set of policies, might not explain cases where the general public support some specific policies while oppose others. Second, climate change mitigation policy cannot be generalised from general environmental policy in instances where the policy does not necessarily require followers to sacrifice in order to support the government climate change mitigation program.

There are some studies that explicitly measure the PS construct, such as the research of O'Connor et al. (2002). This study looked at particular climate change mitigation policies. The authors operationalised PS as the participant's level of voting intention for four hypothesised carbon reduction policies. In contrast to the general statements of "willingness to sacrifice" in the work of Stern et al. (1999), O'Connor and his colleagues attached to the policies in question very specific amounts of extra money that would need to be paid if the participant chose to comply. This approach can help overcome the possible content validity issues identified in the Stern et al. (1999) study, however, the study is still limited to examining policies which mostly require the followers to sacrifice, that is, to pay money to reduce carbon emissions. This distinction is relevant because climate change mitigation policies can instead encourage the general public to voluntarily reduce carbon emissions, such as by subscribing to the solar energy system subsidy policy. This focus on "willingness to sacrifice" thus provides inadequate insight into explaining the variance in the support of the general public for different sets of climate change mitigation policies.

Public opinion surveys suggest that the general public might not equally support each of a government's climate change mitigation polices, even if they support climate change policies in general (O'Connor, Bord & Fisher 1999). For instance, in Hanson's (2012) survey, although 81% of the Australian public agreed that Australia should support actions to tackle climate change, only 36% supported the specific carbon tax policy (Hanson 2012; Nielsen 2012). This complexity in the public support for mitigation policies deserves a closer look. This study argues that the variance in the nature of climate change mitigation policies dictates that a multiple factorial structure would better capture the PS construct, rather than the current conceptualisation that treats PS as a single factor. The recent work of Bostrom et al.

(2012) lends support to this claim, and is one of the most up-to-date studies that investigate PS. The objective of that study was to conduct a comparison across six countries of causal thinking of climate change and its effect on PS. Similar to O'Connor et al.'s (1999) study, Bostrom et al. (2012) focused on the role of perceived adverse impacts of climate change in explaining PS. However this is the first study that highlighted the multiple factorial pattern of the PS construct.

From factor analysis results, Bostrom et al. (2012) grouped the studied policies into "Green policies", "Carbon policies" and "Engineering". The "Carbon policies" set ranged from carbon taxes to international carbon trading schemes, however the other policy sets included policies which were not only impractical but also stretched assumptions about the participants' ability to give a meaningful responses. Solutions such as 'Putting more dust in the atmosphere' or 'Reducing air pollution from toxic chemicals' are not relevant to climate change mitigation goals[1]. In addition, the three-factor pattern was actually found when the authors examined the perceived effectiveness of mitigation policies, not the main dependent construct, PS. The structure of the construct policy support did not reveal the three factors of "Green policies", "Carbon policies" and "Engineering", and only one factor was found. However, for ease of interpretation, the authors grouped the studied policies into these three groups. Although Bostrom et al.'s study did not successfully find a statistical valid multiple factorial structure for the PS construct, it demonstrated that the complexity of the PS construct is worthy of research attention. Moreover, the

[1] This was criticised as a misconception when conceptualising climate change as pollution (Kempton 1993). Thus, this item is not valid to measure the PS construct and should be removed.

study confirmed a positive correlation between the perceived adverse impacts of climate change and PS.

In conclusion, the measures of PS in the studies discussed above share a common limitation. First, the psychometric properties of the PS construct have not been thoroughly investigated. Past studies have failed to detect a multiple factorial pattern for the PS construct with the policies they investigated. This limits the potential for further examination of the variance of general public support for different climate change mitigation policies. Even in cases where a pattern was found, the studies failed to provide a theoretical rationale to support the pattern. The premise therefore of this study is that a PS construct with a multiple factorial structure would better capture the complexity of this important construct. Furthermore, this study argues that this multiple factorial structure should be supported by theoretical reasoning, rather derived solely from empirical results.

In the following section, this chapter proposes a simple model to explain the climate change mitigation policy support behaviour. The model stands on five pillars provided by popular theories in the field: the Theory of Planned Behaviour, the Risk Perception theory, the literature on social dilemmas, the Extended Parallel Process Model (EPPM), and the Risk Perception Attitude (RPA) framework.

2.4 A General Model to Explain Climate Change Mitigation Policy Support Behaviour

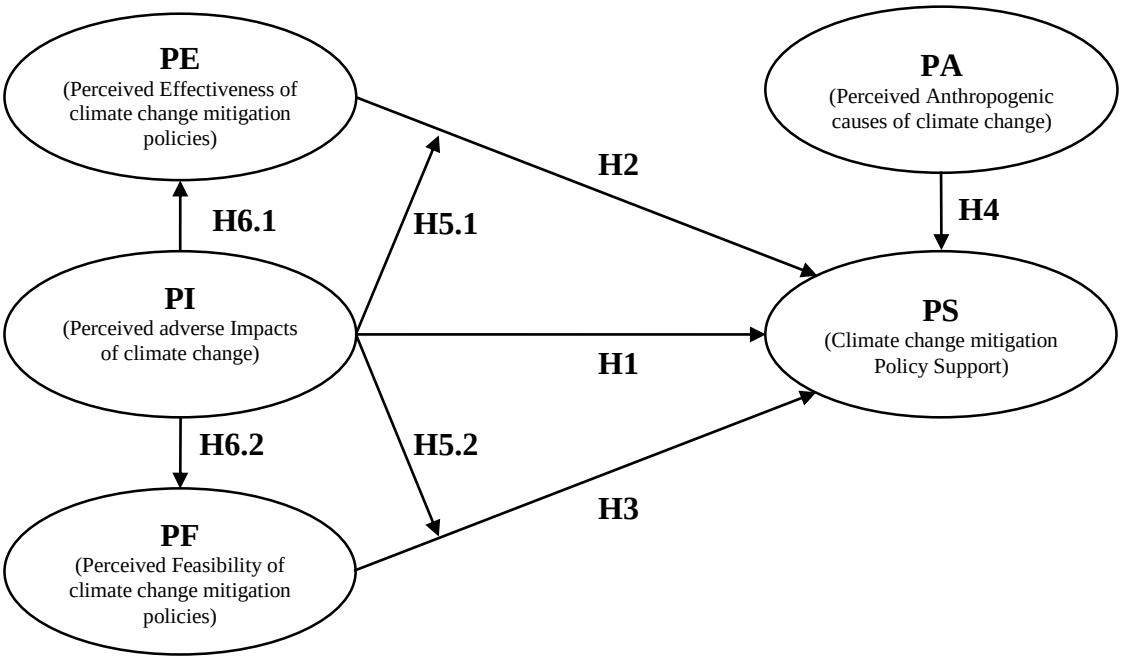
Several theories and models have been employed in the substantial body of literature examining PEBs in general and PS in particular. Amongst these theories, the Risk Perception theory (Slovic 1987), Theory of Planned Behaviour (TPB) (Ajzen 1991) and the Social Dilemma literature (e.g., Wiener & Doescher 1991), and lately the Extended Parallel Process Model (Witte 1992) have received considerable attention. Kollmuss and Agyeman (2002), and Gifford et al. (2011) provide a comprehensive review of these theories, identify their strengths and limitations, and conclude that given the vast variation in human experience of climate change, no single theory can successfully explain this important behaviour (Kollmuss & Agyeman 2002, Wolf & Moser 2011). Therefore, an integrated approach might be preferable in explaining PS.

This study limits its interest to three main theories to explore possible determinants of PS, with particular emphasis on four constructs hypothesised to explain PS: perceived adverse impacts of climate change (PI), perceived anthropogenic causes of climate change (PA), perceived effectiveness of climate change mitigation policies (PE), and perceived feasibility of climate change mitigation policies (PF). The hypothesised interrelationships between these three variables are depicted in Figure 1.

PI is shown to have a direct influence on PS (hypothesis H1). The support for this comes from the Risk Perception theory(Slovic 1987). That is, individuals will try to ameliorate possible perceived harm that might arise through their risk assessment of particular hazards. This correlation is repeatedly confirmed by many studies in the

risk perception literature, including the studies of O'Connor et al. (1999) and Bostrom et al. (2012) discussed earlier.

Figure 1: A general model for explaining public support for climate change mitigation policies



The direct effect of PE on PS (hypothesis H2), an aspect of the general public's attitude toward climate change mitigation policies, is supported by tenets from the Theory of Planned Behaviour (Ajzen 1991) and the Social Dilemma literature (e.g., Wiener & Doescher 1991). This link has not been empirically and theoretically explored as acknowledged by Bostrom et al. (2012). In their call for future research they stated: 'We do not know the sequence of the reasoning process, though we speculate that perceptions that such actions (i.e., climate change mitigation policies) would be effective may be driving support for them' (Bostrom et al. 2012). Thus, the explanatory role of this important construct in PS deserves further investigation.

Through the model detailed at Figure 1, this study aims to not only explore this direct link, but also proposes that PE plays a mediating role in the influence of PI on PS (hypothesis H6.1). Moreover, PI is postulated to be a moderator of the link between PE and PS (hypothesis H5.1). The moderating and mediating hypotheses are drawn upon the Extended Parallel (Witte 1992) Process Model, and the Risk Perception Attitude framework (Rimal & Real 2003).

Finally, this study suggests that in addition to PE, the general public will also evaluate climate change mitigation policies in term of feasibility of the proposed climate change policies or PF. As PF is yet another aspect of the general public's evaluation of climate change mitigation policies, it is proposed that it will act in a manner similar to PE. That is, in addition to having a direct influence on PS (hypothesis H3), PF will also mediate the linkage between PI and PS (hypothesis H6.2), while PI also moderates the relationship between PF and PS (hypothesis H5.2).

The above hypotheses form the general model that is illustrated in the Figure 1. In the next section, this chapter provides definitions of the above independent variables, as well as further theoretical explanations for the proposed linkages.

2.4.1 The roles of perceived adverse impacts of climate change (PI)

This study defines PI as the general public's perception of adverse consequences resulting from climate change. The effects of such perceptions on attitude and behaviour change are well rooted within the risk perception literature. This stream of literature examines individuals risk assessment and their corresponding behaviour when dealing with potential hazards. The employment of risk perception is therefore

apt in explaining general public support for government policies toward mitigating potential harms (Slovic 1987). That is, individuals will try to ameliorate possible perceived harm that might arise through their risk assessment of hazards.

Applied to the climate change context, the risk perception literature examines the linkage between the risk perception of climate change or PI, and ameliorating actions such as climate change mitigation policy support (PS). The common hypothesis examined in such studies is that the more that individuals perceive adverse impacts from climate change, the more likely they are to engage in climate change tackling behaviours (Bostrom et al. 2012; O'Connor, Bord & Fisher 1999). Several empirical studies confirm this hypothesis including Baldassare and Katz (1992), Fransson and Gärling (1999), O'Connor et al. (1999, 2002), and Bostrom et al. (2012). Based on this general consensus, this study proposes the following hypothesis:

[H1] *The more severe the general public perceive adverse impacts of climate change (PI) are, the more they support climate change mitigation policies (PS)*

2.4.2 The roles of perceived effectiveness of climate change mitigation policies (PE)

2.4.2.1 Definition of PE

This study draws on Lubell (2003) to define PE as the general public's belief about the effectiveness of the proposed climate change mitigation policies in achieving a set of positive outcomes. The PE construct is not that dissimilar from the attitude construct defined in the Theory of Planned Behaviour (TPB) as 'the degree to which a person has favourable or unfavourable evaluation or appraisal of the behaviour in question' (Ajzen 1991, p. 188). It could be argued that the attitude construct

measures the individual belief in an outcome of the behaviour, or effectiveness, if the planned behaviour is actually acted upon. In the context of support behaviour towards climate change mitigation policies, PE could be simply treated as an attitude construct that measures an individual's perceptions of effectiveness of the policies in mitigating climate change, if those policies were implemented.

2.4.2.2 Direct linkages of PE to PS

Support from The Theory of Planned Behaviour (Ajzen 1991) TPB postulates that perceived behavioural control, individual's attitudes, and subjective norms determine behavioural intention, while behavioural intention correlates with planned behaviour. Based on this theoretical reasoning it could be argued that an individual's evaluation of climate change mitigation policies in terms of their effectiveness, or PE, has a major influence on their intention to support or oppose the policies in question. This study therefore includes the construct of perceived effectiveness of climate change mitigation policy (PE) as one of the determinants of PS in its proposed model.

Support from the Social Dilemma literature In addition to TPB, the Social Dilemma literature also provides further clues as to the role of PE in explaining PS. Social dilemmas exist when individuals refrain from sacrificing for the good of the community. That is, if they pursue self-interests that, for example, maximise their utility of common goods, even if they recognise their sacrifice would contribute to the common good (Dawes 1980). This is because of the nature of common goods, which allows every member in the community free access to enjoy the equally shared utilities. However, not all members in the society perform pro-environmental behaviours, such as reducing private car usage to reduce air pollution. If one sacrifices their freedom of using a car, all members of the community will enjoy the

better air quality (although marginal) but only the individual, who sacrifices, bears the inconvenience of not driving. Thus, this negative "benefit-cost" may not encourage individuals to engage in pro-environmental behaviours if they pursue self-interest (Wiener & Doescher 1991).

Dawes (1980) characterises social dilemmas as situations in which: (i) the social payoff to each individual for defecting behaviour is higher than the payoff for cooperative behaviour, regardless of what other society members do, and yet, (ii) all individuals in society receive a lower payoff if all defect rather than cooperate. Viewing this study's proposed model from this perspective, it can be seen that climate change affects the biophysical environment, which is considered a common good on a global scale. For instance anyone can access and enjoy the ecological benefits of a well maintained biophysical environment, however failing to mitigate climate change, which may incur a personal cost, will worsen the environment for every individual (Stern 2006).

Many barriers may occur in solving a social dilemma case. One of them is the "Sucker avoid" barrier which describes a process where individuals refrain from cooperating to save the common good because they do not believe the common good will be saved despite their voluntary action (Wiener & Doescher 1991). Weiner and Doescher (1991) suggest that to overcome this barrier policymakers should emphasise the achievability of the goals that their proposed policies pursue. As the effectiveness of climate change mitigation policies might be an aspect which reflects the achievability of climate change mitigation through implementation of the proposed policies, it can be hypothesised that the more the general public perceive

the climate change mitigation policies to be effective, the more likely they are to support these policies. This study therefore proposes.

[H2] *The more effective the general public perceive the climate change mitigation policies are, the more they support the policies*

2.4.3 The roles of perceived feasibility of climate change mitigation policies (PF)

2.4.3.1 Definition of PF

In addition to individual attitudes, the TPB also postulates that one's perceived behavioural control, which measures the object's perception regarding the level of difficulty to perform the interested behaviour, influences the likelihood of the actual act of the planned behaviour. Applying this construct in the context of PS, an individual's perception of the difficulty or feasibility of implementing a particular policy would dictate their support for a particular climate change mitigation policy. Thus, this research defines PF simply as an individual's overall belief of how difficult it would be to implement the policies in question. However this is a complex construct, as individuals might differ in terms of what factors they consider would affect the feasibility of a policy. For instance, some might be concerned about technical feasibility while others might be concerned about political feasibility. However, as one of the first studies of this construct, the study limits its scope by employing PF to gauge the general feasibility of the policies in question. Conceptually, PF is a distinct construct from PE, in the same way as TPB's attitude and behavioural control are.

2.4.3.2 Direct linkages of PE to PS

As suggested by the linkages between TPB's individual behavioural control, and both behavioural intention and actual behaviour, this study's proposed model suggests that individuals might consider the feasibility of their interested climate change mitigation policies. This linkage also draws support from the Social Dilemma literature in the same way as the linkage between PE and PS does. That is, perceptions of feasibility of a policy would also be an aspect that reflects the achievability of climate change mitigation policies. If individuals believe policies are feasible in achieving their climate change mitigation goals, they would be encouraged to take behavioural actions or PS, as it helps individual overcome the barrier of "sucker avoid" in solving the social dilemma of climate change mitigation. This study would therefore expect a positive relationship between PF and PS.

[H3] *The more feasible the general public perceive the climate change mitigation policies are, the more they support the policies*

2.4.4 Perceived anthropogenic causes of climate change (PA)

One might argue that unless climate change is perceived to be caused by human activities, the public would not support any policies to mitigate its impacts. This argument has been well examined. Several studies have reported that the belief in anthropogenic causes of climate change varies with the level of individual engagement in climate change mitigation activities, including climate change mitigation policy support behaviour (O'Connor, Bord & Fisher 1999; Aitken, Chapman & McClure 2011; Sibley & Kurz 2013). In line with this view, this study

also includes perceived anthropogenic causes of climate change as a determinant of PS.

[H4] *The more anthropogenic the general public perceive the causes of climate change to be, the more they support climate change mitigation policies*

2.4.5 Mediating roles of PE and PF, and moderating roles of PI from the perspective of Extended Parallel Process Model (EPPM) and the Risk Perception Attitude (RPA) framework

In addition to the direct effect of PE and PF on PS, it is likely that these constructs may also mediate the linkage between PI and PS. PI is also proposed as moderators of the links PE – PS and PF – PS. Support for these propositions are drawn from the Extended Parallel Process Model (EPPM) and the Risk Perception Attitude (RPA) framework.

2.4.5.1 The Extended Parallel Process Model (EPPM)

The EPPM was introduce by Witte (1992) as a means of advancing the parallel process model of (Leventhal 1970) and the Protection Motivation Theory (Rogers 1975, 1983), to explain why the common "fear appeal" approach fails. Although the EPPM is popular in the field of health communication (e.g., Barnett et al. 2014; Goei et al. 2010; McMahan, Witte & Meyer 1998; Smith et al. 2008; So 2013), it is applicable in the context of climate change mitigation policy (Linden & Sander 2014). In fact, there have been calls for the combination of the EPPM with public policy research to enhance the effectiveness of climate change communication (Hart & Feldman 2014).

This study and EPPM cover conceptually similar constructs. The three main components of the EPPM are perceived responsive efficacy, perceived threat, and responsive intention or behaviour. The construct of perceived responsive efficacy measures the degree to which individuals believe that the proposed solution will effectively resolve the issue in question. The concept of perceived threat is measured by two aspects: perceived severity and perceived susceptibility. Through this concept an individual's beliefs in the severity of threat and in the likelihood the threat in question will be experienced, can be determined (Rimal & Real 2003; Witte 1992). Therefore, the EPPM's perceived responsive efficacy, perceived threat, and responsive behaviour are a close match to this study's constructs of PE, PI and PS, respectively.

According to the EPPM, communicating risks without also addressing the effectiveness of the proposed risk ameliorating solution will not trigger behavioural changes. Risks are functional, as they stimulate individuals' attention to a particular behavioural change. However, the EPPM postulates that when individuals perceive threats from an issue in question, their trigger is to evaluate the effectiveness of the proposed responsive solutions before considering behaviour change. Only when the individuals perceive that the proposed solutions will be effective, that is, the perceived responsive efficacy is high enough, will they engage in behavioural or intentional change. Conversely, if the responsive efficacy is determined to be insufficient, behavioural change will not be triggered even though individuals perceive threats. This implies that the EPPM treats responsive efficacy as a mediator between perceived threat and responsive behaviour.

The EPPM also claims the degree to which responsive efficacy influences the likelihood of behavioural change is conditioned by the individuals' perception of the threat. In other words, perceived threat moderates the link between responsive efficacy and behavioural change engagement. That is, if the perceived threat is low, individuals will not proceed to the state of evaluating the responsive efficacy of proposed threat ameliorating solutions. Thus any increase of responsive efficacy does not lead to increased engagement in behavioural change. However, if the perceived threat is high enough, individuals will evaluate the effectiveness of the proposed ameliorating solutions. Two scenarios will therefore eventuate depending on the level of perceived responsive efficacy. If the perceived responsive efficacy of the solutions is high, the individuals will support the proposed solutions, and hence behavioural intention or behavioural change will occur. This is labelled the "threat control process". Conversely, low levels of perceived responsive efficacy will activate the "fear control process" which demotivates individuals to engage in the responsive intention/behaviour to cope with the "high" perceived threat (Witte 1992). Consequently, in either the "fear control process" or the "threat control process", high levels of perceived threats better amplify the impact of responsive efficacy on behavioural change in comparison to low levels of perceived threat, according to the EPPM.

2.4.5.2 The Risk Perception Attitude (RPA) framework

While the PE construct of this study is similar to the EPPM's concept of responsive efficacy, it is still unclear the extent to which the PI construct is conceptually similar to the EPPM's perceived threat. In fact, they are differently measured. In the health communication context in which the EPPM is commonly applied, perceived threat is

measured after the participant is presented a passage, picture or type of media (e.g., Barnett et al. 2014; Goei et al. 2010; McMahan, Witte & Meyer 1998; Smith et al. 2008; So 2013). In other words, perceived threat is artificially controlled by the researchers (Rimal & Real 2003). The participant may or may not perceive the communicated threat before being exposed to the media. On the other hand, perceived risk is commonly measured "as-it-is" where there is no artificial interference. Participants form their perception of risk towards a particular hazard in question through their daily interactions with media (e.g., television, newspapers, radio) and/or face-to-face conversations. To apply the EPPM in this study's context, one should take into account the difference between "perceived threat" (as proposed by the model) and "perceived risk" (as measured in this study). The Risk Perception Attitude (RPA) framework is employed to indicate this difference.

The Risk Perception Attitude (RPA) framework (Rimal & Real 2003) can help resolve the issue of the difference between perceived threat and perceived risk. The RPA framework postulates that these two constructs are interchangeable, and therefore perceived risk can play the same role as perceived threat to predict responsive behavioural change. The RPA framework 'conceptualizes risk perception as a property not of the message but rather of the individual' (Rimal & Real 2003, p. 372). This assumption together with EPPM's propositions form the Risk Perception Attitude (RPA) framework (Rimal & Real 2003).

Heavily influenced by the EPPM, the RPA framework's main propositions are similar to those of the EPPM model. That is, the RPA framework postulates that the difference in the likelihood of behavioural change engagement between individuals who perceived low risk and low responsive efficacy ("indifference" group), and

those who perceived low risk and high responsive efficacy ("proactive" group) is not identical. Furthermore, individuals who perceive high risk and high responsive efficacy ("responsive" group) are more likely to engage in behavioural change compared to those who perceive high risk but low responsive efficacy (Rimal & Real 2003). This is similar to the EPPM's assumed moderating effect of perceived threat on the link between perceived responsive efficacy and behavioural change engagement. Moreover, the RPA also places responsive efficacy as a mediator between perceived risks and responsive behavioural engagement.

Applying the RPA framework to study the use of sun screen to avoid skin cancer, Rimal and Real (2003) found that those who believed they had a high risk of skin cancer, and believed that sunscreen had high effectiveness in preventing the disease (the "responsive" group) were more likely to engage in the behaviour than individuals who perceived the same degree of risk but had less confidence in the effectiveness of the behaviour (the "avoidance" group). This result is analogous to what the EPPM postulates. However, the authors came to a conclusion that responsive efficacy is more influential in low-risk groups than it is in the high-risk groups, which conflicts with the EPPM's propositions (Rimal & Real 2003). The authors clarify this assertion by stating that perceived risk is formulated by a high degree of perceived threat.

It can be concluded that the EPPM together with the RPA framework provide general theoretical support for the assertion that responsive efficacy is a mediator to the link between perceived risk and responsive behavioural change. Consequently, this study postulates that perceived policy effectiveness could mediate the link between perceived adverse impacts of climate change and policy support.

Considering PF as another aspect of individuals' evaluation of the policies, this study also hypothesises that PF is a mediator of the link between PI and PS.

[H5.1] *PE mediates the relationship between PI and PS*

[H5.2] *PF mediates the relationship of PI and PS*

Moreover, drawing on the EPPM and the RPA framework, this study postulates that perceived adverse impacts of climate change moderates the link between perceived policy effectiveness and policy support. However, it is unsure to what extent PI moderates these two links. According to the EPPM, perceived threat would positively moderate the link between perceived responsive efficacy and responsive behaviour engagement. Nevertheless, considering the interchangeability between the EPPM's perceived threats and the RPA framework's perceived risks, the evidence of this positive moderating effect is mixed (Rimal & Juon 2010; Rimal & Real 2003). Therefore, this study at this stage still cannot conclude the extent to which PI moderates the PE – PS and PF – PS links, but postulates that:

[H6.1] *PI moderates the relationship of PE and PS*

[H6.2] *PI moderates the relationship of PF and PS*

2.5 Refinement of the General Model

The previous section proposed a general model that employed PI, PE, PF, and PA to explain the dependent construct – PS. The aim of this section is to combine the general model with multiple-factorial structures of the examined constructs. This is

to propose a more detailed theoretical model to help better capture the complexity of the behaviour of climate change mitigation policy support.

2.5.1 A theoretical factorial structure of PS as suggested by the Social Dilemma literature

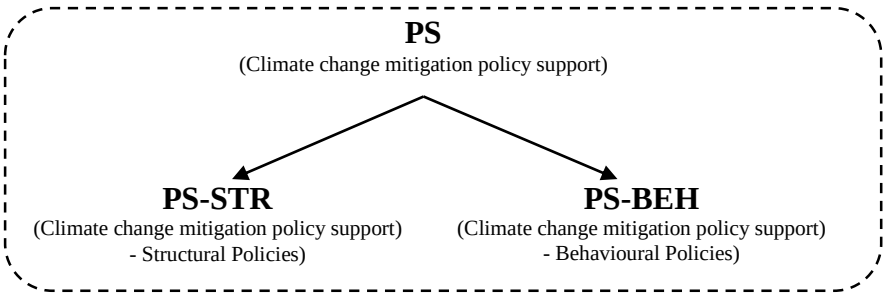
As discussed earlier, the PS construct has not been well understood. Studies have either found too simplistic a factorial structure, for example a sole factorial structure, or failed to give theoretical support to the found factorial pattern. Those limitations constrain valuable implications as the literature may fail, for example, to explain why the general public might vote for some policies but oppose others. PS is explained by its determinants such as PI, PE and PF, however, this study argues that the nature of climate change mitigation policies also matters to the general public voting behaviour.

Considering climate change as a social dilemma case, climate change mitigation policies can be seen as solutions that resolve that dilemma. Therefore, the policies could be profiled into structural and behavioural solutions, as suggested by the Social Dilemma literature (Messick & Brewer 1983), as could the PS construct. More specifically, climate change mitigation policies could be grouped into two categories: structural policies and behavioural policies. Structural policies aim to reduce the two properties of a social dilemma by putting constraints on an individual's freedom. Meanwhile, the behavioural policies encourages individuals to behave voluntarily for the sake of the cooperation itself (Messick & Brewer 1983). Among climate change mitigation policies, carbon taxes are structural policies as they limit consumers'

choices, for example of fossil fuel use. Meanwhile, tax rebate policies for energy efficient household equipment are behavioural policies, as they for instance, encourage consumers to choose a "greener" fridge. Therefore, PS could also be profiled into two factors as described by the proposition below.

[P1] *The PS construct can be measured in two categories: support for (i) Structural Policies (**PS-STR**) and (ii) Behavioural Policies (**PS-BEH**).*

Figure 2: A theoretical factorial structure of the "Climate change mitigation policy support" construct



2.5.2 A theoretical factorial structure of perceived adverse impacts of climate change (PI)

2.5.2.1 Possible reflection of the 'Value' domain into the PI construct – Inputs from the Value – Belief – Norm model

The Value – Belief – Norm (VBN) model developed by Stern et al. (1999) has attracted much attention in the pro-environmental behaviour (PEB) literature in general and in studies of PS behaviours in particular. The VBN model defines three different value positions: altruistic, egoistic and biospheric. The model suggests what value position an individual holds will influence their environmental belief domain, which includes an ecological worldview (NEP), adverse consequences for valued

objects (AC) and perceived ability to reduce threat (AR). The environmental belief domain in turn has a causal linkage to the pro-environmental personal norm construct that directly influences the PEBs construct. Moreover, as noted by Stern et al. (1999), elements in the chain might have direct impacts on any of the other elements down the chain. For instance, the altruistic value can have significant power in directly explaining climate change policy support behaviour (Shwom et al. 2010). Being positioned at the first link of the chain, the value component would play a significant role in the VBN model.

As postulated by the VBN model, depending on the value an individual holds, s/he might perceive adverse consequences from an environmental problem, that is, the risk perception of an environmental issue, to most impact either the personal domain (egoistic value), other members of the society (altruistic value) or the biosphere (biospheric value). Therefore, it can be theoretically assumed that the value domain would be well reflected in the adverse consequences (AC) construct. Moreover, it can be seen that the AC construct to some degree captures the idea of environmental risk perception and therefore the PI construct. Thus, the general public risk perception of environmental issues would also reveal a three-factor structure of egoistical impact, altruistic impact and biospherical impact. However, does this reflection stand true in the context of climate change? The discussion below will explore the possibility of measuring the PI construct through these three aspects: altruistic, egoistic and biospheric.

2.5.2.2 Asymmetric reflection of the 'Value' domain into the PI construct – Empirical evidence from the literature

When using very similar items to measure perceived adverse impacts from climate change, O'Connor et al. (1999) found only one factor, while Bostrom et al. (2012) found two factors, personal and societal perceived adverse impacts of climate change. These findings suggest that the reflection of the value domain to the PI construct might be asymmetric.

Unlike other environmental problems such as water pollution, climate change has long-term accumulated and geographically large-scale impacts which may be hard to recognise for the general public. Climate change is a 'global, complex, invisible problem' (Moser 2010a, p. 35). This important differentiation might limit the reflection of the value domain to the risk perception of climate change. In a research by Bostrom et al. (2012), the item 'Increased rates of serious disease all over the world' has a relatively high factor loading (0.63) to the "Societal consequences" factor. However this item also has a moderate factor loading of 0.53 to the other factor of "Personal consequences". This suggests a possible mix of the egoistic and altruistic value when being reflected in the PI construct.

Similarly, the complexity and invisibility of causes and impacts of climate change might confuse the general public when they perceive climate change risks to the biosphere even if the individuals hold the "biospheric value". Bostrom et al. (2012) found the item 'Massive species extinctions', was the only item that measured perceived biospheric adverse impacts of climate change, and cross-loaded onto the "Societal consequences" factor. Therefore, it could be concluded that the biospheric

value is also mixed with the altruistic value when individuals reflect their value domain in the PI construct.

The evidence from Bostrom et al.'s (2012) study also suggests an asymmetric reflection of the value domain in the PI construct. Thus, this current study argues that due to the complexity in causes and impacts of climate change, the value domains of altruistic, egoistic and biospheric values as suggested by the VBN model might not offer an appropriate theoretical factorial structure for the PI construct.

2.5.2.3 Factorial structure of PI construct: perceived high-critical and low-critical adverse impacts of climate change

It is worth noting that this study does not contradict the role of the value domain in building risk perception in the context of climate change. Instead, it argues that the value domain is still the root of risk perception, although the visible pattern of risk perception might not reflect the value domain. The complexity and invisibility in causes and effects of climate change would make the general public simplify their perceived climate change risks.

The outcome of the simplification process is that the general public, as laypersons, might profile their perceived climate change risks according to the likelihood that these risks affect their livelihood. Consequently, this study asserts that the perceived adverse impacts of climate change may be categorised into two domains: high-critical and low-critical adverse impacts. High-critical adverse impacts would refer to perceived obvious and highly possible damage to human (including the individual and the other members in the society) basic needs such as food or health. Meanwhile,

low-critical adverse impacts include long-term or implicit risks of climate change that might impact human wellbeing indirectly.

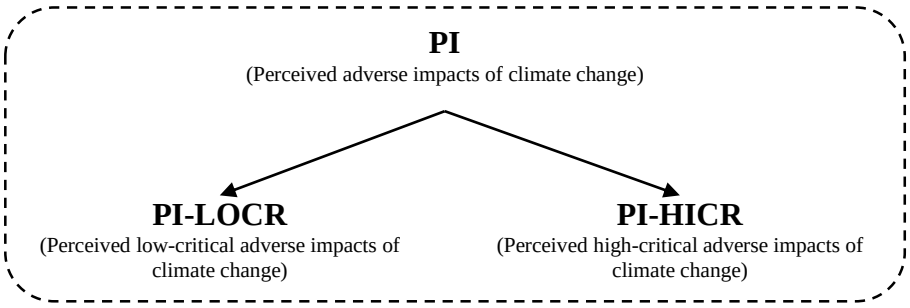
It is argued then that altruistic, egoistic and biospheric value domains, as defined by the VBN model, may be combined into these two simplified categories of perceived risks. For instance, if an urban resident categorises the impact of climate change on farmers as a high-critical risk, it does not necessarily imply that s/he holds an altruistic value as s/he might be showing concerns about resultant food shortages which may affect both the individual and the famers or other individuals. That is, the border between egoistic and altruistic values is blurred when considering a high-critical risk of food shortage caused by climate change.

In addition, possible adverse impacts to the biosphere or non-human species, such as biodiversity reduction, might be categorised as a low-critical perceived risk. The rationale for this argument is that from a lay perspective, it may be hard to distinguish the impact of climate change on the natural biosphere, or on themselves or other members of the society, at least in the short-term. Once again, the complexity and invisibility of climate change's cause and effect could be attributed for this simplification of perceived climate change risk.

It is also important to note that perceptions of high-critical and low-critical climate change adverse impacts might vary depending on contextual factors. For instance, residents in a coastal area might perceive that a rise in sea-level is a high-critical impact caused by climate change. However, residents who are living in a mountainous area might perceive that it is a low-critical risk.

[P2] *The PI construct can be measured in two categories: (i) Perceived low-critical adverse impacts (PI-LOCR) and (ii) Perceived high-critical adverse impacts (PI-HICR).*

Figure 3: A factorial structure of the "Perceived adverse impacts of climate change" construct



2.5.3 A refined model explaining public support for climate change mitigation policies

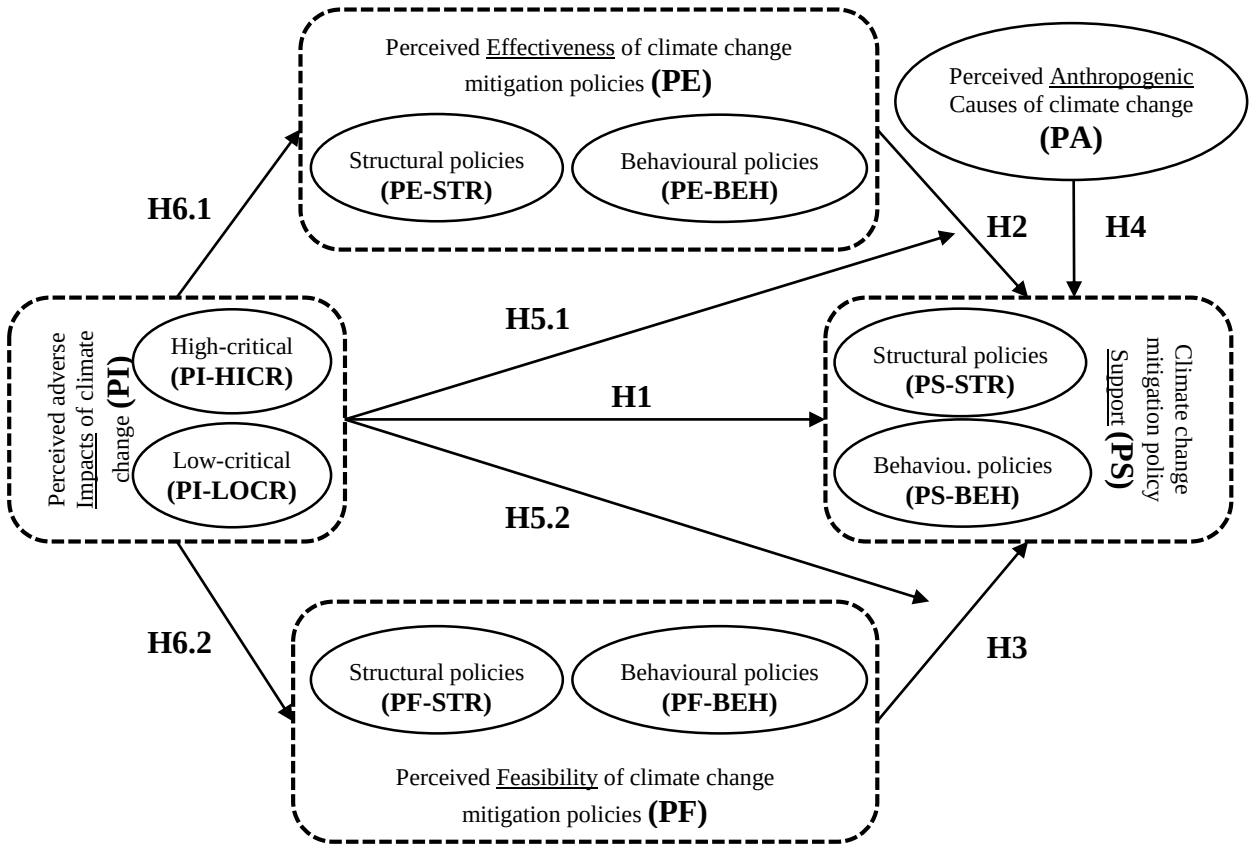
As explained above, this study suggests that PS could be captured in two categories: support for structural (PS-STR) and behavioural (PS-BEH) climate change mitigation policies (P1 - Figure 2). Accordingly, this study also examines the PE and PF constructs on these two dimensions: perceived effectiveness of structural mitigation policies (PE-STR), perceived effectiveness of behavioural mitigation policies (PE-BEH), perceived feasibility of structural mitigation policies (PF-STR), and perceived feasibility of behavioural mitigation policies (PF-BEH).

As discussed in the previous section, the PI construct is hypothesised as able to be measured in two categories: (i) perceived high-critical (PI-HICR) and (ii) perceived low-critical adverse impacts of climate change (PI-LOCR) (P2 - Figure 3). By

integrating the general model (Figure 1) with propositions P1 and P2, a more refined model is suggested as illustrated in the Figure 4.

In particular, PS-STR and PS-BEH are explained by PI-HICR and PI-LOCR *(H1)*; PE-STR and PE-BEH *(H2)*; PF-STR and PF-BEH *(H3)*; and PA (*H4*). Regarding the proposed moderating effects, PI is hypothesised to moderate the links between PE and PS *(H5.1)*; and to moderate the links between PF and PS *(H5.2)*. Besides their direct influences on PS, PE and PF are hypothesised to have mediating effects on the relationship between PI and PS *(H6.1, H6.2)* (Figure 4).

Figure 4: A refined model explaining the general public's climate change mitigation policy support



2.6 Discussion

This study focuses on an important but relatively unexplored aspect of pro-environmental behaviour in the context of climate change viz. the general public's support for climate change mitigation policies (PS). This study proposes a general model employing four broad constructs based on dominant theories and models in the literature. The constructs explored are perceived adverse impacts of climate change (PI), perceived anthropogenic causes of climate change (PA), perceived effectiveness (PE) and feasibility (PF) of climate change mitigation policies to explain PS.

In addition to the direct impacts of PI, PA, PE to PS, which have been repeatedly confirmed in the literature (Baldassare & Katz 1992; Fransson & Gärling 1999; O'Connor et al. 1999,2002, Bostrom et al. 2012), the proposed model contributes to the literature by proposing the effect of PF, which is proposed as another aspect of the general public's evaluation of climate change mitigation policies, to the PS construct. Highlighting the mediating roles of PE and PF, this study contributes to the literature by suggesting another possible mechanism through which PE and PF might impact the level of the general public support of climate change mitigation policies. The proposed moderating effects of PI on the links of PE – PS and PF – PS suggest potential interactive effects of the key determinants of PS.

The proposed direct as well as moderating effects of the two important, yet not fully investigated, constructs PE and PF would help better explain regulatory support behaviour in the context of climate change, and therefore benefit policymakers. The Social Dilemma literature suggests that in order to improve the general public support for climate change mitigation policies, the effectiveness and feasibility of the

policies in question should be well communicated. Addressing the moderating effects would help utilise the commonly employed factor of perceived adverse impacts of climate change, and the newly explored perceived policy effectiveness and feasibility, to maximise public support for climate change mitigation policies.

Another contribution of this chapter is that it examines deeper structures of the PS construct and the proposed determinants by attempting to provide theoretical multiple-factorial structures to the constructs. Integrating the general model with the suggested propositions of theoretical factorial structures of PI, PS, PE and PF constructs, a more refined model is proposed (Figure 4). This model helps compare the influence of climate change impacts according to differing degrees of criticalness to the climate change mitigation regulatory support behaviour. In addition, this model is among the first attempts to look at the deeper meaning of climate change mitigation policy support behaviour by taking into account the nature of the policies in question. Empirical evidence produced through the application of this model would help provide insight into the variations of climate change mitigation policy support behaviour of the general public. This would in turn help policymakers better understand public support for climate change mitigation policies.

CHAPTER THREE

WHAT DRIVES PUBLIC SUPPORT FOR CLIMATE CHANGE MITIGATION POLICIES? – EMPIRICAL EVIDENCE FROM THE AUSTRALIAN GENERAL PUBLIC

3.1 Overview

Chapter Two proposed an analytical framework which employs four determinants to explain public support for climate change mitigation policies (PS): perceived adverse impacts of climate change (PI), perceived mitigation policy effectiveness (PE), perceived mitigation policy feasibility (PF), and perceived anthropogenic causes of climate change (PA). The framework postulates that the four determinants directly drive policy support behaviour. Chapter Three tests the assertion with a field-surveyed sample of 1,476 Australian general public participants. Exploratory factor analysis results support the proposed multiple-factorial structures of PI and policy-related constructs: PS, PE and PF. This paves the way for incorporating mitigation policies' fundamental characteristics into examining the policy support behaviour. Regression results show that in most of the examined cases, the four determinants are statistically significant in explaining PS. The results also help expand the understanding of the role of PI by demonstrating that different aspects of this construct affect policy preferences. Furthermore, the data suggest that the PE

construct is a salient driver of mitigation policy support behaviour. The theoretical and practical contributions are also discussed.

3.2 Introduction

Gaining public support for climate change mitigation policies requires effort. Policymakers need to inform the public about the basic facts of climate change, including its possible adverse impacts and anthropogenic causes. Informing the public about the adverse effects of climate change is a popular strategy for enlisting support for mitigation policies (Linden & Sander 2014). However it is also essential to convey the effectiveness and feasibility of proposed climate change mitigation policies. Lack of public support could result if policies are not perceived as sufficiently effective and feasible, even if the community agrees that climate change will have severe adverse impacts, and that human activity is responsible.

The carbon tax in Australia is an example of this situation. Public support for this policy was limited irrespective of how many surveys demonstrated public awareness of climate change impacts and support for the Labor government's general mitigating actions (Nielsen 2012; The Climate Institute 2013). The carbon tax was seen as ineffective in reducing carbon emissions which probably explains its lack of public support to the extent that it was abolished (Hannam 2014; Lo & Spash 2012). Moreover its lack of success implies that fear tactics, for example, providing descriptive information about the damages of climate change without also providing details of substantive remedies, is not effective in gaining community support for policies (Linden & Sander 2014; Shome, Debika et al. 2009). Instead, the public

needs to be convinced that the proposed policies are effective. However, the influence of the public's perception of climate change mitigation policy effectiveness on public support for the policies has been inadequately addressed.

This chapter describes empirical tests of the analytical framework proposed in Chapter Two with a field-survey sample of the Australian general public. Specifically, this chapter examines the direct impacts of four determinants on climate change mitigation policy support behaviour. These determinants are: perceived adverse impacts of climate change (PI); perceived mitigation policy effectiveness (PE); perceived mitigation policy feasibility (PF); and perceived anthropogenic causes of climate change (PA). The direct impacts mentioned above are backed up by major theories that include the Theory of Planned Behaviour (Ajzen 1991), the Risk Perception Theory (Slovic 1992), and Social Dilemma literature (e.g., Wiener & Doescher 1991).

This chapter's objectives are twofold. First, it aims to verify the propositions of multiple-factorial structures of the policy-related constructs: PE, PF, and PS, and the PI variable (P1 and P2, see Chapter Two). Empirical tests will take into account the fundamental characteristics of climate change mitigation policies as described in Social Dilemma literature and more thoroughly examines the mentioned direct influences (Wiener & Doescher 1991). Second, the chapter aims to compare the influences on PS of two drivers: PE and PI. Although the latter is a well-documented determinant of PS, the former is inadequately examined. Further understanding the role of PE might help gain insights into cases such as Australia's carbon tax, which was abolished partially due to perceptions of low effectiveness in reducing carbon emissions (Hannam 2014; Lo & Spash 2012). This knowledge will assist

policymakers to better utilise the examined drivers in their communication regarding climate change mitigation policies, and consequently build public support.

The following section briefly summarises the analytical framework, and re-states the hypotheses tested in this chapter. The survey instrument, data, and methodology are then described.

3.3 Analytical Framework and Hypotheses

The direct influences of the four determinants on public support for mitigation policies are illustrated in Figure 5 below. This figure is adapted from the analytical framework outlined in Chapter Two (Figure 4).

The four determinants PI, PE, PF, and PA are hypothesised to have direct influences on mitigation policy support (PS). Specifically, this study hypothesises:

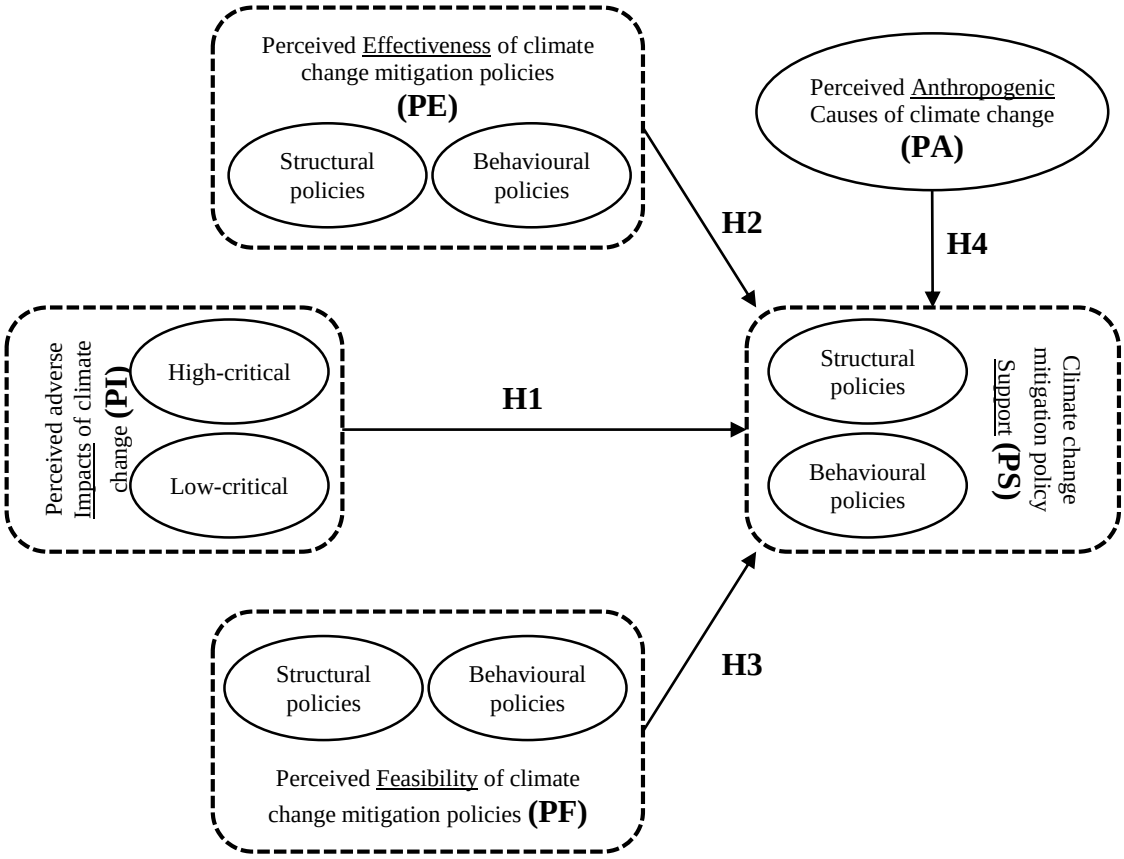
[H1] *The more severe the general public perceive adverse impacts of climate change (PI) are, the more they support climate change mitigation policies (PS)*

[H2] *The more effective the general public perceive the climate change mitigation policies (PE) are, the more they support the policies (PS)*

[H3] *The more feasible the general public perceive the climate change mitigation policies (PF) are, the more they support the policies (PS)*

[H4] *The more anthropogenic the general public perceive the causes of climate change (PA) to be, the more they support climate change mitigation policies (PS)*

Figure 5: Direct influences of the determinants on climate change mitigation policy support



The construct of perceived adverse impacts of climate change (PI) used in this study is rooted in the Risk Perception Theory (Slovic 1987, 1992). According to this theory, individuals are likely to seek ameliorating solutions to cope with their perceived risks. Considering mitigation policies are solutions to resolve the risks of adverse impacts of climate change, this study therefore asserts that PI drives PS.

The Theory of Planned Behaviour (TPB) (Ajzen 1991) provides support for [H2] and [H3] linkages. It is postulated that the constructs of perceived policy effectiveness (PE), and policy feasibility (PF) capture the TPB's attitude and behavioural control concepts respectively. According to the TPB, attitude and behavioural control determine behavioural intention, and thereafter behavioural change. Consequently,

PE and PF are hypothesised to have direct impacts on mitigation policy support behaviour. Social Dilemma literature also provides support for this linkage. It is recommended that to encourage individuals to cooperate, the aspects of effectiveness and feasibility of proposed actions should be empathised (Wiener & Doescher 1991).

The linkage [H6] is backed by empirical evidence. The literature has reported that the belief in anthropogenic causes of climate change varies with the level of individual engagement in climate change mitigation activities, including climate change mitigation policy support behaviour (O'Connor, Bord & Fisher 1999; Aitken, Chapman & McClure 2011; Sibley & Kurz 2013).

This chapter will test these hypotheses with a consideration of deeper structures of PI, PE, PF, and PS constructs (Figure 5). In order to do so, this chapter first investigates the propositions regarding the multiple-factorial structures. These propositions are:

[P1] *The PS construct can be measured in two categories: supports for (i) Structural Policies (**PS-STR**) and (ii) Behavioural Policies (**PS-BEH**)*

[P2] *The PI construct can be measured in two categories: (i) Perceived low-critical adverse impacts (PI-LOCR) and (ii) Perceived high-critical adverse impacts (PI-HICR)*

This section summaries the model anticipating the direct influences of the four determinants on public support for mitigation policies. The hypotheses and propositions tested in this chapter are also presented. For more details regarding the theoretical perspective and the extent to which the above hypotheses and

propositions are built, please prefer to Chapter Two. The following section introduces the data and analytical methods.

3.4 Methodology

3.4.1 Participants

The data was collected using web-based surveys in 2012. A link to the web-based questionnaire was distributed to a panel of Australian adult participants by a professional market research firm (see Appendix 5 for the questionnaire's content). The sample was screened to include only climate change believers who answered 'YES' to the questions 'Do you think that global climate change is occurring at present?', and 'Do you think that global climate change is likely to occur over the next five years?' (73.7% of the total responses). The rationale for this approach is that according to Hine et al. (2013), Australian climate change non-believers (about 21% of the authors' sample) were most likely to reject climate change information and disfavour mitigation actions. This study therefore assumed that little information could be extracted from these participants and it focused only on the sample of climate change believers. The data was further screened to remove inconsistent and incomplete responses, resulting in an effective sample of 1,476 participants. Among them 40% were female, 25.8% were under 30 years old, 62.7% were from 30 to 69 years old, 28.8% were above 70 years old, 49.5% employed, 44% university graduates, and 88% from urban areas (see Appendix 3).

3.4.2 Measures

This study measured the perceived adverse impacts of climate change using a set of nine items in two time frames: the last and the next five years. The items were adopted from previous research including Bostrom et al. (2012), and O'Connor et al. (1999, 2000). The items were subsequently modified to make them relevant to the Australian context (e.g., Kevin, 2011; Preston & Jones, 2006) (see Table 1). The perceived anthropogenic causes of climate change were measured by a single item following the example of Aitken et al. (2011) and Sibley et al. (2013).

The survey asked the participants to rate ten climate change mitigation policies in terms of effectiveness and feasibility (see Table 2 and Table 3). Among these policies were those that had been implemented, and some that were hypothetical (see Table 4). The study sought to gauge general public support for these policies (see Table 4), using a five-point Likert scale for all questions.

To simplify the structure of multiple-item scales, factor analyses using SPSS statistical software version 21 was used. The factor analyses were based on principle component analysis with the Varimax rotation method. Cross-loading item(s) from the scales was/were removed. From the results of the factor analyses, sub-scales were obtained by retaining only high-loaded items on each of the derived factors. All the factor analyses passed Kaiser-Meyer-Olkin (KMO ranged from .86 to .94) and Bartlett's tests (p <.01) (Hair 2010, p. 105).

The Cronbach's Alphas was used to examine reliability of full-scales and sub-scales. A value above .70 indicates sufficient scale reliability even though the .60 threshold is acceptable (Hair 2010). The validated sub-scales were subsequently aggregated to

form an index for each of the sub-scales. Thereafter direct effects of PI, PA, PE, and PF on PS were tested using the Ordinary Least Square (OLS) regression method.

3.4.2.1 Perceived adverse impacts of climate change (PI)

The survey asked participants to rate a set of possible adverse impacts of climate change in the last five years and over the next five years (Table 1). The wording was: 'To what extent do you think climate change has been a cause of the following possible outcomes over the past five years?' and 'Given current trends, to what extent do you think that climate change will be a cause of any of the following possible outcomes over the next five years?' The rating was based on a five-point Likert scale: 1 = 'Not at all', 3 = 'Moderately' and 5 = 'Totally'.

The factor analysis revealed two factors based on larger than 1.0 of the Eigen value. Scree-plot analysis also supports the two-factor result. Factor one included items that captured perceived adverse consequences such as weather pattern changes, biodiversity decreases, and sea level rises (factor loadings are in bold, Table 1). Meanwhile, Factor two summarised adverse consequences of climate change to human wellbeing, such as food production, community health, and personal income reduction.

Compared to the impacts of Factor one, Factor two touched on more critical and explicit damages. Although impacts such as weather pattern changes and biodiversity losses will ultimately affect individuals, those effects may be only recognised in the long-term. Therefore Factor one captures a lower level of personal worry or concern than Factor two. Consequently, this study interprets Factor one as low-critical perceived adverse impacts of climate change (PI-LOCR) and Factor two as high-

critical impacts (PI-HICR). There is a consistent pattern for both the perceived adverse impacts of climate change in the last five years and those five years into the future. The two sub-scales (factors) indicate high reliability as Cronbach's Alphas were larger than .90. This supports the study's proposition P2. The item 'Reduced availability of fresh water for drinking and farming' cross-loaded to both factors and was therefore excluded from further analysis.

3.4.2.2 Perceived anthropogenic causes of climate change (PA)

This study employed a single-item to gauge the degree to which the participants believe that climate change is caused by human activities or natural causes. The wording was: 'To what extent do you think the climate change that occurred over the past five years has been induced by human activities, and to what extent is it a factor of natural causes?' The anchors of the five-point Likert scale were labelled as 1 = 'Exclusively due to natural causes', 3 = 'Fairly equal combination of both' and 5 = 'Exclusively due to human activities'.

3.4.2.3 Perceived effectiveness of climate change mitigation policies (PE)

Table 2 consists of ten actual and hypothetical climate change mitigation policies that the participants were asked to rate in term of effectiveness. The wording was: 'How effective do you think that the actions and policies below could be in helping to prevent global climate change?' A five-point Likert scale was employed and the endpoints were labelled as 1 = 'Not at all effective', the midpoints as 3 = 'Moderately effective' and the highest score as 5 = 'Totally effective'.

Table 1: Exploratory Factor Analysis Results – Perceived adverse impacts of climate change (PI) (The general public sample)

			PCA factor loadings	
Items (n=1,476)	**Mean**	**Std. Err**	**Low critical**	**High critical**
Perceived adverse impacts of climate change in the past five years				
1. Changing weather patterns	3.45	0.03	**.83**	.25
2. Floods	3.36	0.03	**.84**	.32
3. Drought	3.31	0.03	**.83**	.32
4. Biodiversity decreases	3.19	0.03	**.67**	.44
5. Community health problems	2.74	0.03	.43	**.75**
6. Reduced personal income	2.43	0.03	.18	**.87**
7. Reduced food production	2.95	0.03	.49	**.69**
8. Rise in sea levels	3.26	0.03	**.70**	.44
9. Reduced availability of fresh water for drinking and farming	2.99	0.03	.57	.62
Perceived adverse impacts of climate change in the next five years				
1. Changing weather patterns	3.41	0.03	**.84**	.33
2. Floods	3.29	0.03	**.84**	.41
3. Drought	3.27	0.03	**.83**	.41
4. Biodiversity decreases	3.13	0.03	**.65**	.55
5. Community health problems	2.79	0.03	.46	**.79**
6. Reduced personal income	2.64	0.03	.29	**.86**
7. Reduced food production	3.04	0.03	.56	**.69**
8. Rise in sea levels	3.23	0.03	**.72**	.46
9. Reduced availability of fresh water for drinking and farming	3.06	0.03	.64	.61
Cronbach's Alpha – Full-scale	.97			
Cronbach's Alpha – Sub-scale			.97	.94
% of variance explained – each factor			69.81%	7.27 %
% of variance explained – all factors	77.09%			
Kaiser-Meyer-Olkin (KMO)	.94			
Bartlett's Test of Sphericity	$p < .001$($df = 153$)			

Table 2: Exploratory Factor Analysis Results – Perceived effectiveness of climate change mitigation policies (PE) (The general public sample)

Items (n=1,476)	Mean	Std. Err	PCA factor loadings	
			Behavioural policies	**Structural policies**
1. Government subsidies for more energy efficient household equipment	2.98	0.03	**.71**	.47
2. Government subsidies for more energy efficient business equipment	3.08	0.03	**.72**	.46
3. Government support for a Cap and Trade or Emissions Trading Scheme	2.79	0.03	.44	**.79**
4. Increased investment in renewable energy	3.57	0.03	**.83**	.29
5. International standards for more energy efficient products	3.42	0.03	**.82**	.32
6. Introduction of a carbon tax	2.37	0.03	.16	**.86**
7. Education about actions to reduce climate change	3.34	0.03	**.73**	.39
8. A self-regulatory carbon usage scheme managed by business groups	2.43	0.03	.32	**.62**
9. Improvements in public transport	3.29	0.03	**.82**	.25
10. Investment in fuel efficient vehicles	3.48	0.03	**.86**	.20
Cronbach's Alpha – Full-scale	.93			
Cronbach's Alpha – Sub-scale			.94	.77
% of variance explained – each factor			63.34%	9.19%
% of variance explained – all factors	72.53%			
Kaiser-Meyer-Olkin (KMO)	.91			
Bartlett's Test of Sphericity	$p < .001 (df = 45)$			

The factor analyses yielded a two-factor result. The two factors together explain more than 72% of the variance. Factor one explains 63.34% and Factor two explains 9.19%. Factor one summarises policies that encourage voluntary actions to mitigate climate change. Factor two consists of carbon-related policies that would force individuals and businesses to reduce their carbon footprint. Considering climate change mitigation as a social dilemma case, and the policies as solutions for resolving it (see Wiener & Doescher, 1991), Factor one was interpreted as perceived effectiveness of Behavioural policies (PE-BEH) that encourage members of society to act voluntarily to mitigate climate change. Factor two results pertain to the perceived effectiveness of Structural policies (PE-STR), such as those reducing individuals' freedom of choice (e.g., reducing consumption of fossil fuel) (Messick and Brewer 1983). The two sub-scales achieved adequate reliability as their Cronbach's Alphas ranged from .77 to .94.

3.4.2.4 Perceived feasibility of climate change mitigation policies (PF)

The participants were also asked to rate the feasibility of the ten policies. The wording was: 'How difficult do you think it would be to get action undertaken on each of the following possible activities?'. A five-point Likert scale was used in which 1 = 'Not at all difficult', 3 = 'Moderately difficult' and 5 = 'Totally difficult'.

The factor analysis of the PE construct revealed two factors. The two factors explained around 63% of the variance. Applying the same logic categorising the PE construct, the ten-item scale of PE was reduced to two sub-scales: perceived feasibility of Behavioural policies (PF-BEH) and of Structural policies (PF-STR). The two factors were reliable as their Cronbach's Alphas were .61 and .91. Therefore, it can be concluded that proposition P1 is supported.

Table 3: Exploratory Factor Analysis Results – Perceived feasibility of climate change mitigation policies (PF) (The general public sample)

Items (n=1,476)		Mean	Std. Err	PCA factor loadings	
				Behavioural policies	**Structural policies**
1.	Government subsidies for more energy efficient household equipment	3.24	0.03	**.83**	.13
2.	Government subsidies for more energy efficient business equipment	3.16	0.03	**.83**	.15
3.	Government support for a Cap and Trade or Emissions Trading Scheme	3.01	0.03	.45	**.63**
4.	Increased investment in renewable energy	3.13	0.03	**.83**	.21
5.	International standards for more energy efficient products	2.72	0.03	**.69**	.28
6.	Introduction of a carbon tax	3.27	0.03	-.05	**.89**
7.	Education about actions to reduce climate change	3.59	0.03	.65	.28
8.	A self-regulatory carbon usage scheme managed by business groups	2.83	0.03	.40	**.54**
9.	Improvements in public transport	3.04	0.03	**.79**	.15
10.	Investment in fuel efficient vehicles	3.12	0.03	**.80**	.16
Cronbach's Alpha – Full-scale		.89			
Cronbach's Alpha – Sub-scale				.91	.61
% of variance explained – each factor				51.19%	11.42 %
% of variance explained – all factors		63.62%			
Kaiser-Meyer-Olkin (KMO)		.86			
Bartlett's Test of Sphericity		$p < .001 (df = 45)$			

Table 4: Exploratory Factor Analysis Results – Support for climate change mitigation policies (PS) (The general public sample)

Items (n=1,476)	Mean	Std. Err	PCA factor loadings	
			Behavioural policies	**Structural policies**
1. Government subsidies for more energy efficient household equipment	4.38	0.02	**.80**	.20
2. Government subsidies for more energy efficient business equipment	4.27	0.02	**.75**	.23
3. Government support for a Cap and Trade or Emissions Trading Scheme	3.69	0.03	.30	**.81**
4. Increased investment in renewable energy	4.51	0.02	**.82**	.13
5. International standards for more energy efficient products	4.40	0.02	**.79**	.22
6. Introduction of a carbon tax	2.84	0.04	.02	**.79**
7. Education about actions to reduce climate change	4.43	0.02	**.72**	.28
8. A self-regulatory carbon usage scheme managed by business groups	3.37	0.03	.14	**.61**
9. Improvements in public transport	4.58	0.02	**.80**	.02
10. Investment in fuel efficient vehicles	4.51	0.02	**.81**	.07
Cronbach's Alpha – Full-scale	.83			
Cronbach's Alpha – Sub-scale			**.91**	.62
% of variance explained – each factor			49.10%	13.90%
% of variance explained – all factors	63.00%			
Kaiser-Meyer-Olkin (KMO)	.87			
Bartlett's Test of Sphericity	$p < .001(df = 45)$			

3.4.2.5 Climate change mitigation policy support (PS)

Finally, participants were asked to rate their level of support for the set of ten climate change mitigation policies (Table 4). The wording was: 'We are interested in your level of support for possible actions proposed to combat climate change. To what extent do you support the following activities?' The rating was based on a five-point Likert scale designed as 1 = 'Totally oppose' to 5 = 'Totally support'. The pattern found in the PE and PF constructs was again confirmed by the factor analysis of the PS construct. The factor analysis also revealed a two-factor result. The two factors explained 63% of the variance and had Cronbach's Alphas of .62 and .91 that showed sufficient reliability of the two sub-scales. Similar to the interpretation of the factor analysis results of PE and PF constructs, it was concluded that the participants rated their level of support for two sets of policies: Behavioural (PS-BEH) and Structural (PS-STR) policies (proposition P1 is supported).

3.5 Demographics

The literature has controlled demographics such as gender, age, income and education when examining PS. However, their influences on PS are mixed. In particular, females perceived climate change as having a greater impact than males (Leiserowitz 2006). Consumers with higher education levels (Leiserowitz 2006; O'Connor et al. 2002), and females (Leiserowitz 2006) were more likely to support tax policies for climate change mitigation. Meanwhile, Bostrom et al. (2012) found climate change policy supporters were not profiled by gender. Shwom et al. (2010) found that age, gender and education were not predictors of policy support, while

income was. Even though the results are mixed it is important to include demographics in the examination of pro-environmental behaviour (Wells, Ponting, and Peattie 2011). Therefore, this study also controls for demographics such as age, gender, education, income and employment as well as political affiliation.

3.6 Results

3.6.1 Understanding public support for Behavioural policies

As can be seen in Table 5, Model 1 includes only two independent variables of the perceived low-critical and high-critical adverse impacts of climate change. It shows that the perceived low-critical adverse impacts of climate change positively predict the level of support for behavioural policies. The perceived high-critical impacts negatively predict the level of support for the policies. This implies that individuals are likely to support behavioural policies if they perceive the impact of climate change is low-critical. However, individuals are less likely to support behavioural policies once they perceive high-critical impacts such as those to personal income or community health. This only partially supports the H1 hypothesis.

Model 2 includes perceived anthropogenic causes of climate change into the equation. The model confirms the results of Model 1. Moreover it indicates that individuals are likely to support behavioural policies if they perceive climate change is caused by human activities. This result therefore supports the hypothesis H4.

As the variables of perceived effectiveness and perceived feasibility of both behavioural and structural policies are included, Model 3 better explains the sample

variance as R-square reaches around 23%. The model highlights that the perceived effectiveness of behavioural policies is the main driving force for individuals supporting them. In contrast, behavioural policies are less likely to gain support from individuals who believe in the effectiveness of structural policies. Therefore, the hypothesis H2 is only partially supported. Moreover, the result shows that the perceived feasibility of policies does not significantly explain the dependent variable. Thus, the H3 hypothesis is not supported.

The strength of the perceived effectiveness variable also weakens the explanatory strength of the variables that were presented in Model 2. However, the perceived effectiveness of behavioural policies strengthens the negative predictive impacts of the perceived high-critical climate change impact of the dependent variable. The demographics as shown in Model 4 do not significantly affect the strength of the independent variables that result from Model 3, although they slightly increase the explained variances to 29%. However, when controlling for demographic variables, the feasibility of behavioural policies become statically significant. Thus, it can be concluded that the H3 hypothesis is partially supported when controlling for demographic variables.

Among the controlled demographic variables, only age, employment, and political affiliation statistically explain the dependent variable PS-BEH. More specifically, age and support for the Greens political party increase the level of support for behavioural climate change mitigation policies. However, part-time employees are likely to oppose those policies.

Table 5: Main effect results – Dependent variable: Support for Behavioural policies (The general public sample)

	Dependent variable: Support for Behavioural policies (PS-BEH)			
	Model 1 Beta[a, b] (S.E.)	Model 2 Beta[a, b] (S.E.)	Model 3 Beta[a, b] (S.E.)	Model 4 Beta[a, b] (S.E.)
(Constant)				
Perceived adverse impacts of climate change –*Low-critical* **(PI-LOCR)**	.35 *** (.03)	.31*** (.03)	.19*** (.03)	.16*** (.03)
Perceived adverse impacts of climate change – *High-critical* **(PI-HICR)**	-.135** (.02)	-.15** (.02)	-.19*** (.02)	-.15*** (.02)
Perceived anthropogenic causes of climate change **(PA)**		.10*** (.02)	.04 (.01)	.05 (.01)
Perceived Effectiveness – *Behavioural policies* **(PE-BEH)**			.51*** (.02)	.50*** (.02)
Perceived Feasibility – *Behavioural policies* **(PF-BEH)**			.05 (.02)	.06* (.02)
Perceived Effectiveness – *Structural policies* **(PE-STR)**			-.12*** (.02)	-.14*** (.02)
Perceived Feasibility – *Structural policies* **(PF-STR)**			.04 (.02)	.03 (.02)
Demographics				
Gender (female=1)				-.02 (.02)
Age				.23*** (.01)
Education				.04 (.01)
Income				-.04 (.01)
Full-time				-.07 (.05)
Part-time				-.09* (.05)
Unpaid jobs				-.04 (.05)
Retired				-.08 (.05)
Labour Party				.06 (.04)
Liberal Party				-.04 (.04)
National Party				-.03 (.08)
Green Party				.07* (.05)
Independent Party				.01 (.05)
F (df)	52.32*** (1475)	39.54*** (1475)	64.27*** (1475)	31.25*** (1475)
R-square	.07	.07	.23	.30
Adjusted R-square	.07	.07	.23	.29
Change statistics				
R-square change	.07	.01	.16	.07
F change *(df1, df2)*	52.32*** (2,1473)	13.11*** (1,1472)	76.72*** (4,1468)	10.54*** (13,1455)

[a] Standardised coefficients
[b] *p < .05, **p < .01, ***p < .001, all are two-tailed tests, n = 1,476
S.E. = Standard Error

3.6.2 Understanding public support for Structural policies

As shown in Table 6, the variable of perceived low-critical adverse impacts of climate change positively predicts the level of support for structural policies as it does in the case of behavioural policies (Model 5). Interestingly, individuals that perceived high-critical adverse impacts of climate change are only likely to support structural policies, and not behavioural policies (Model 5, Model 6). In addition, it was found that individuals who believe humans cause climate change are also likely to support structural policies. Therefore the hypothesis H4 is supported in the case of structural policies.

Model 7 and 8 reveal a pattern where perceived effectiveness of policies impacts the dependent variable PS-STR in the same way that it explains behavioural policies (PS-BEH). Individuals are likely to support structural policies once they believe in their effectiveness. To the contrary, those who believe in the effectiveness of behavioural policies are likely to oppose structural policies.

The role of the variable of perceived policy effectiveness in the models that explain structural policy support is stronger than in the case of behavioural policies. That is, the introduction of this variable makes perceived adverse impacts of climate change statistically insignificant in explaining the support for structural policies. Noticeably, the variable of perceived policy feasibility becomes statistically significant in explaining structural policy support behaviour, yet it is not in explaining behavioural policy support (Model 7, 8). Therefore, the hypothesis H3 is partially supported when examining structural policies.

Among controlled demographics, only gender and employment are statistically significant. Specifically, females and retired individuals are more likely to support structural climate change mitigation policies.

In summary, regression results for both structural and behavioural mitigation policies show that although H1 hypothesis is partially supported when examining the roles of the perceived adverse impacts of climate change construct alone, it is no longer supported when introducing perceived policy effectiveness and feasibility variables into the model. Individuals tend to support one domain of mitigation policies and oppose the other if they perceive the former effective and feasible, and vice versa. For instance, participants are be likely to support behavioural and oppose structural policies if they perceive that behavioural policies are effective in climate change mitigation, and feasibly be implemented. Therefore the H2 and H3 hypotheses are only partially supported. The variable of perceived anthropogenic causes of climate change is statistically significant when examining the two domains of mitigation policies, therefore H4 hypothesis is fully supported. Nevertheless, it is noted that the influences of perceived policy effectiveness on policy support behaviour are weak in the cases of both behavioural and structural policies (Model 4, 8).

Table 6: Main effect results – Dependent variable: Support for Structural policies (The general public sample)

	Dependent variable: Support for Structural policies (PS-STR)			
	Model 5 Beta[a, b] (S.E.)	Model 6 Beta[a, b] (S.E.)	Model 7 Beta[a, b] (S.E.)	Model 8 Beta[a, b] (S.E.)
(Constant)				
Perceived adverse impacts of climate change – *Low-critical* **(PI-LOCR)**	.31*** (.04)	.25*** (.04)	.04 (.03)	.03 (.03)
Perceived adverse impacts of climate change – *High-critical* **(PI-HICR)**	.17*** (.03)	.15*** (.03)	.03 (.03)	.04 (.02)
Perceived anthropogenic causes of climate change **(PA)**		.17*** (.02)	.09*** (.02)	.09*** (.02)
Perceived Effectiveness – *Behavioural policies* **(PE-BEH)**			-.20*** (.02)	-.20*** (.02)
Perceived Feasibility – *Behavioural policies* **(PF-BEH)**			.02 (.02)	.02 (.02)
Perceived Effectiveness – *Structural policies* **(PE-STR)**			.82*** (.02)	.77*** (.02)
Perceived Feasibility – *Structural policies* **(PF-STR)**			.06** (.02)	.05** (.02)
Demographics				
				.02 (.03)
Gender (female=1)				.08*** (.01)
Age				.03 (.01)
Education				-.03 (.01)
Income				.01 (.05)
Full-time				-.02 (.06)
Part-time				.00 (.06)
Unpaid jobs				.00 (.06)
Retired				.10*** (.04)
Labour Party				-.04 (.04)
Liberal Party				-.02 (.09)
National Party				.06 (.06)
Green Party				.00 (.06)
Independent Party				.03 (.03)
F (df)	194.82*** (1475)	147.94*** (1475)	303.03*** (1475)	115.86*** (1475)
R-square	.21	.23	.59	.61
Adjusted R-square	.21	.23	.59	.61
Change statistics				
R-square change	.21	.02	.36	.02
F change *(df1, df2)*	194.82*** (2,1473)	43.05*** (1,1472)	322.43*** (4,1468)	6.76*** (13,1455)

[a] Standardised coefficients

[b] *p < .05, **p < .01, ***p < .001, all are two-tailed tests, n = 1,476; S.E. = Standard Error

3.7 Discussion

3.7.1 Expanding the understanding of the role of PI rather than confirming it

The results of the factor analysis of the PI construct suggest that emotional factors such as worry or concern could shape individuals' perceptions of climate change adverse impacts. This demonstrates ways that emotional aspects influence cognitive ones when forming risk perceptions in complex and uncertain circumstances such as climate change (Linden & Sander 2014; Slovic et al. 2004). If one argues that individuals perceive the adverse impacts of climate change through cognitive processes, emotional factors may be embedded in that rationalising processes. In this case, emotional factors may offer a base to differentiate adverse impacts of perceived climate change.

The literature suggests that PI positively predicts PS. However, by reanalysing the factorial structure of both the independent variable PI, and the dependent variable PS, this study furthers the understanding of the role of PI in explaining the likelihood of support for climate change mitigation policies, rather than only confirming it. Specifically, a perception of low-critical adverse impacts of climate change is associated with support for both behavioural and structural mitigation policies. On the contrary, individuals with a perception of high-critical adverse impact response are likely to oppose behavioural policies and support structural ones.

The difference between structural and behavioural solutions, as suggested by the social dilemma theory, could explain this variation. Structural solutions are mandatory for every society member, and would help solve the barrier of "free-riding" in solving social dilemmas (Wiener and Doescher 1991). A high-critical

perception possibly leads to a belief that every society member should cooperate to resolve the risks presented by climate change. Moreover, the high-critical nature of perceived adverse impacts of climate change, such as potential damage to personal income and the community health, may encourage individuals to sacrifice by obeying mandatory policies to ameliorate the impacts. This would furthermore explain why believers in high-critical adverse impacts do not believe society should rely on voluntary actions or behavioural solutions, to resolve climate change issues.

It is necessary to state that the previously discussed role of PI would be maintained only when examining the unique effect of the construct on the dependent variable. As shown in the results, the dominance of variables such as PE would make PI statistically insignificant.

3.7.2 The salience of perceived policy effectiveness in explaining mitigation policy support

The results support the proposition that perceived policy effectiveness is important in explaining the level of support for mitigation policies (e.g., Bostrom et al. 2012). The extent to which individuals believe in the effectiveness of policies influences the likelihood of supporting or opposing them. In fact, PE is dominant over other well-established determinants of PS such as PI and PA when this study included all the variables in one model. Moreover, examining the influences of PE on PS across two different aspects of mitigation policies, behavioural and structural, reveals a more complex pattern. That is, those who believe in the effectiveness of behavioural policies would support those policies and oppose structural policies, and vice versa.

The difference between structural and behavioural policies, as discussed earlier, could explain this contradiction.

This chapter's findings imply that a combination of the Theory of Planned Behaviour (TPB) and the literature on Social Dilemma better explains the specific behaviour of support for climate change mitigation policies. Individuals' attitudes toward behaviour, in terms of the behaviour's effectiveness in resolving the targeted problems, might influence the likelihood of them actually performing the behaviour, as postulated by the Theory of Planned Behaviour. However, the TPB may not explain the variation in public support towards different types of policies if their nature is not considered. The Social Dilemma literature can provide a theoretical rationale for such classification. The combination of the TPB and Social Dilemma literature therefore helps understand the effect of individuals' beliefs in policy effectiveness on their preference for different types of policies.

CHAPTER FOUR

EXPLAINING PUBLIC SUPPORT FOR CLIMATE CHANGE MITIGATION POLICIES – IDENTIFYING THE "GATEKEEPER" AND WHY "LESS IS MORE ONLY WHEN MORE IS TOO MUCH"

4.1 Overview

Chapter Three found that perceived adverse impacts of climate change and policy effectiveness are key drivers of public support for mitigation policies. Despite this, a question that remains unanswered is: how does low perceived policy effectiveness (PE) dampen public support (PS) when the public is aware of the adverse impacts of climate change (PI)? This question is in fact rooted from our limited understanding regarding the mechanism through which PE drives PS. Moreover, it has been warned that communicating risks (e.g., PI) without emphasising the effectiveness of risk ameliorating solutions (e.g., PE) may be ineffective. The rationale behind this suggestion is that two constructs PE and PI may interact each other when they explain PS. Does this happen in the context of climate change mitigation policy support behaviour? This chapter endeavours to address these questions drawing on the Extended Parallel Process Model (EPPM) and the Risk Perception Attitude (RPA) framework. The hypothesis is that PE mediates the link between PI and PS. PI is also hypothesised to be a moderator of the PE – PS link. Examining data from a

sample of 1,476 Australians collected through an online survey, it was found that PE both fully and partially mediates the PI–PS linkage. However, the data also suggest that PI weakens the PE – PS relationship and thus contradicts predictions of the EPPM. The study suggests opportunities for application of the EPPM to this new area: climate change mitigation policy support behaviour. Marketing implications to stimulate public support for mitigation policies are also offered.

4.2 Introduction

Chapter Three found that perceived policy effectiveness (PE) is dominant in explaining mitigation policy support (PS), and that the different aspects of perceived adverse impacts of climate change (PI) affect individuals support for either behavioural or structural climate change mitigation policies. However, many questions are left unanswered. For instance, through which mechanism does PE affect PS (Bostrom et al. 2012)? Moreover, one may argue that if PE is such a dominant driver of PS, then policymakers should eliminate PI out of their climate change communication. Nevertheless, the literature shows that the strategy of communicating risks to encourage policy support is common, yet it may be unsuccessful if an effective solution to adverse risks is not conveyed (Linden & Sander 2014; Witte 1992). Furthermore, it is unclear the extent to which PI and PE independently explain PS. This leads to the question of if PE and PI affect each other in explaining PS, or in other words, is there an interaction effect from PI and PE? Answering these questions is important if one wishes to focus on the two concepts in communicating climate change mitigation policies.

Chapter Four therefore examines the mechanism by which PE affects PS. It also investigates the interaction effect of PI and PE as the two constructs explain PS. The examination of these two research questions are drawn upon support from the Extended Parallel Process Model (EPPM) (Witte 1992), and the Risk Perception Attitude framework (Rimal & Real 2003). Among theories and models in the literature, those two models offer the most appropriate theoretical rationales to examine the two questions. This is because the models include the main concepts of this study: risk perception (PI), responsive efficacy (PE), and behavioural change (PS). For more details regarding the operational opportunity those models into this study's context, please refer to Chapter Two.

It is noted that the analytical framework proposed in Chapter Two included perceived policy feasibility (PF) into the moderating and mediating hypotheses. However, due to the inconsistent and weak influences of the construct on the dependent variable of policy support behaviour that were found in Chapter Three, this chapter excludes the construct from further analysis. Therefore the hypotheses examined in this chapter are:

[H4] *PE mediates the link between PI and PS, that is, PI influences PS through PE*

[H5] *PI moderates the link between PE and PS, that is, the effect of PE on PS is conditioned by PI*

This chapter tests the above hypotheses on the same sample of 1,476 Australians which were discussed in Chapter Three. Please refer to that chapter for more details regarding data collection, the survey instrument, and construct measures. The

following section will introduce the empirical tests; thereafter discussions and marketing implications are provided.

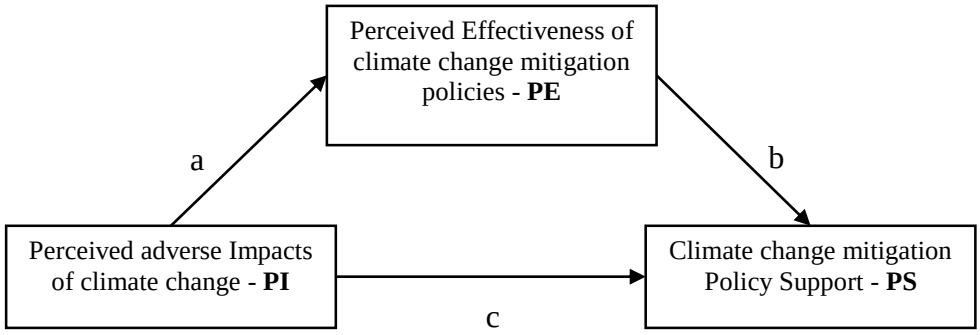
4.3 Methodology

This chapter applies measures of the variables in question developed in Chapter Three. All the required empirical tests were conducted using the PROCESS macro installed on SPSS statistical software (Hayes 2012). The PROCESS macro provides mediating and moderating effects tests based on the multiple Ordinary Least Square (OLS) regression method. The testing procedures are as follows.

4.3.1 Testing the mediating effect hypotheses

The PROCESS macro tested the mediating effects through three steps, to identify direct and indirect effects of the independent variable (PI), on the dependent variable (PS), through the mediator (PE) (Hayes 2012) (Figure 6).

Figure 6: Mediating effect testing framework



First, path *a* was identified by a single regression analysis in which PE was the dependent variable, and PI was the independent variable. Second, a multiple regression analysis, in which PS was explained by PI and PE, was conducted to examine direct effects of PI and PE on PS (paths *b*, *c*). The mediating effect was concluded if paths *a* and *b* were statistically significant (MacKinnon, Fairchild & Fritz 2007). PE fully mediated the PI – PS link if the path *c* was statistically insignificant, otherwise a partial-mediating effect was detected. A full-mediating effect implies that the independent variable cannot affect the dependent variable without the mediator's presence. A partial-mediating effect means that the independent variable affects the dependent variable in both ways: directly (without the mediator) and indirectly (through the mediator). Finally, if the mediating effect is concluded, then the indirect effect of PI on PS would be identified by the bias-corrected bootstrap approach with 10,000 bootstrap samples (Hayes 2013, p. 111; Hayes & Scharkow 2013).

The mediating effect of PE on the PI – PS link was examined in two cases: support for behavioural and for structural climate change mitigation policies. Chapter Three found that the participants were likely to support behavioural policies if they perceived low-critical PI (PI-LOCR) and that the policies were effective. Therefore, the PE of behavioural policies was examined as the mediator of the link between PI-LOCR and support for the behavioural policies (PS-BEH). In the case of structural policies, the participants tended to support the policies if they perceived both low-critical and high-critical PI, and that the policies were effective. Hence, the PE of the structural policies was tested as a mediator to the relationship between low-critical PI (PI-LOCR) and support for structural policies (PS-STR); and between high-critical

PI (PI-HICR) and PS-STR. Thus, there were three empirical tests for the mediating effect hypothesis.

- *Case One: Behavioural policy effectiveness (PE-BEH) and the relationship between perceived low-critical adverse impacts of climate change (PI-LOCR) and support for behavioural policies (PS-BEH).*

- *Case Two: Structural policy effectiveness (PE-STR) and the relationship between perceived low-critical adverse impacts of climate change (PI-LOCR) and support for structural policies (PS-STR).*

- *Case Three: Structural policy effectiveness (PE-STR) and the relationship between perceived high-critical adverse impacts of climate change (PI-HICR) and support for structural policies (PS-STR).*

4.3.2 Testing the moderating effect hypothesis

Testing of the moderating effect hypothesis was also conducted by multiple OLS regression method using the PROCESS macro (Hayes 2012). The test consisted of two steps. First, the independent (PE) and moderating (PI) variables were introduced to explain the dependent variable (PS). Second, the interaction term of PE and PI was included, with PE and PI to predict PS. To conclude that the moderating effect exists, the coefficient of the interaction term and R-square change are required to be statistically significant. Independent and moderating variables were mean-centred

before regression analyses for the ease of later interpretation (Dalal & Zickar 2012). Similarly to the empirical tests for the mediating effect hypothesis, the moderating effect was also tested in the three cases described above.

4.4 Results

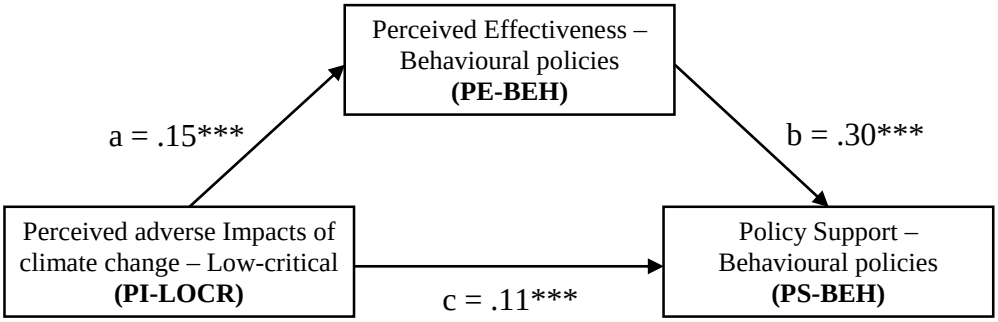
The mediating and moderating hypotheses were tested through the earlier mentioned three cases. The following section will describe results of mediating effect tests.

4.4.1 Mediating effects

4.4.1.1 Case One: Behavioural policy effectiveness (PE-BEH) and the relationship between low-critical PI (PI-LOCR) and support for behavioural policies (PS-BEH).

The results show that perceived low-critical climate change adverse impacts significantly explain the perceived policy effectiveness of behavioural policies (a = .15***, *R*-square = .50, *F* (19, 1456) = 77.86, *p* <. 001) (Figure 7).

Figure 7: Mediating effect of behavioural policy effectiveness on the link between perceived low-critical adverse impacts of climate change and the policy support.



(All displayed coefficients are unstandardised; ****p* <. 001)

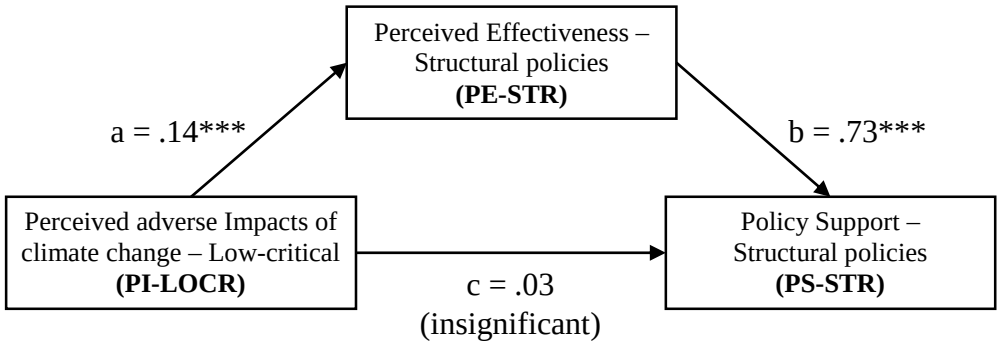
This aspect of perceived adverse impacts of climate change is also statistically significant in explaining individuals' support for behavioural policies, when controlling for the effectiveness of those policies (b = .30***, c = direct effect = .11***, *R*-square = .30, *F* (20, 1455) = 31.25, *p* <. 001). This indicates that the construct of perceived policy effectiveness partially mediates the relationship between perceived low-critical adverse impacts of climate change and support for behavioural climate change mitigation policies. The bias-corrected bootstrap confidence interval yielded a statistically significant indirect effect of PI on PS (indirect effect = .04, *SE* = .01, *Lower level confidence interval* = .02, *Upper level confidence interval* = .07).

4.4.1.2 Case Two: Structural policy effectiveness (PE-STR) and the relationship between low-critical PI (PI-LOCR) and support for structural policies (PS-STR).

Case One reveals a partial mediating effect of PE on the link between PI and PS, however testing in Case Two results in a full-mediating effect of PE on the relationship. The construct of perceived low-critical adverse impacts of climate change still statistically significant in explaining perceived policy effectiveness (a = .14***, *R*-square = .57, *F* (19, 1456) = 102.80, *p* < .001) (Figure 8). Contrary to Case One, PI-LOCR is not statistically significant in explaining PS-STR when controlling for perceived policy effectiveness (b = .73***, c = .03 (insignificant), *R*-square = .61, *F* (20, 1455) = 115.86, *p* <. 001). This implies that PI-LOCR has no direct effect on PS-STR. Consequently the data suggests that perceived policy effectiveness fully mediates the link between perceived low-critical adverse impacts of climate change and support for structural policies. The bias-corrected bootstrap confidence interval

yielded a statistically significant indirect effect of PI on PS (indirect effect = .10, *SE* = .03, *Lower level confidence interval* = .05, *Upper level confidence interval* = .15).

Figure 8: Mediating effect of structural policy effectiveness on the link between perceived low-critical adverse impacts of climate change and the policy support.

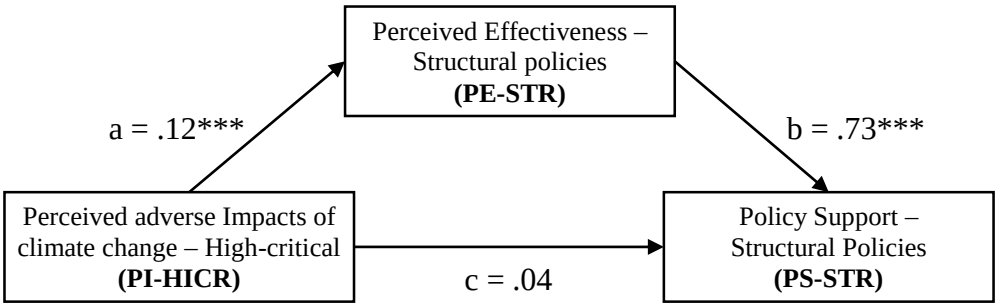


(All displayed coefficients are unstandardised; ****p* <. 001)

4.4.1.3 *Case Three: Structural policy effectiveness (PE-STR) and the relationship between high-critical PI (PI-HICR) and support for structural policies (PS-STR).*

Similarly to Case Two, the construct of perceived effectiveness is found to have a full-mediating effect on the PI – PS relationship (Figure 9).

Figure 9: Mediating effect of structural policy effectiveness on the link between perceived high-critical adverse impacts of climate change and the policy support.



(All displayed coefficients are unstandardized; ****p* < .001)

Specifically, the relationship between PI-HICR and PE-STR is statistically significant (a = .12***, *R*-square = .57, *F* (19, 1456) = 102.80, *p* < .001). PI-HICR has no direct effect on PS-STR (b = .73***, c = .04 (insignificant), *R*-square = .61, *F* (20, 1455) = 115.86, *p* < .001). The bias-corrected bootstrap confidence interval results in a statistically significant indirect effect of PI on PS (indirect effect = .09, *SE* = .02, *Lower level confidence interval* = .05, *Upper level confidence interval* = .13).

In summary, all tests for the three cases support hypothesis H6, that perceived policy effectiveness mediates the relationship between perceived adverse impacts of climate change and individuals' policy support behaviour. Specifically, it was found that a partial-mediating effect was found when examining public support for behavioural climate change mitigation policies. Furthermore, full-mediating effects were detected when examining individuals' support behaviour for structural policies.

4.4.2 Moderating effects

Table 7 illustrates results of moderating effect tests. It was found that the construct of low-critical adverse impacts of climate change was found to be statistically insignificant in moderating the link between the perceived effectiveness of behavioural policies and policy support behaviour (Δ*R-square* = .00, Δ*F* (1, 1454) = 1.19, *p* = .28) (Table 7, Model 9). However moderating effects of PI on the link between PE and PS were detected in the case of structural policy support behaviour. Specifically, the null-hypothesis of the moderating effect of low-critical PI to the link between PE-STR and PS-STR can be rejected (Δ*R-square* = .01, Δ*F* (1, 1454) = 40.67, *p* <. 001). Similarly, that of high-critical PI on the link between PE-STR and

PS-STR can also be rejected ($\Delta R\text{-}square$ = .01, ΔF (1, 1454) = 38.36, p < .001) (Table 7, Model 10, 11).

To understand the moderating effects of perceived high-critical and low-critical adverse impacts of climate change in detail, this study examined the simple slopes of the PE-STR – PS-STR relationship on different percentiles of those moderators (PI-LOCR and PI-HICR). The slope coefficient of the PE-STR – PS-STR linear relationship at the low PI-LOCR group (10^{th} percentile value) is .89 (SE = .03, p < .001), and at the moderate PI-LOCR group (50^{th} percentile value) is reduced to .75 (SE = .02, p < .001). The slope coefficient is further reduced to .63 at the high PI-LOCR group (90^{th} percentile value) (SE= .03, p < .001). This indicates that the perceived low-critical adverse impacts of climate change negatively moderate the link between structural policies' perceived effectiveness and support for those policies.

A similar pattern was found when conducting simple slope analyses for the identification of the high-critical adverse impacts of climate change as the moderator of the PE-STR – PS-STR link. PI-HICR weakens the link between the perceived effectiveness of structural policies and support for them. The slope coefficient of the linear relationship at the low PI-HICR group (10^{th} percentile value) is .89 (SE = .03, p < .001), and is reduced to .76 (SE = .02, p < .001) at the 50^{th} percentile value of PI-HICR. At the 90^{th} percentile value of the moderator, the slope coefficient remains at .64 (SE = .03, p < .001).

The results indicate that the H5 hypothesis of the moderating effect is partially supported. Specifically, the moderating effect cannot be concluded during

examination of support for behavioural policies. However the moderating effects were found to be statistically significant in examples of structural policies.

4.5 Discussion

This study suggests that the Extended Parallel Process Model (EPPM) and the Risk Perception Attitude (RPA) framework are applicable to the context of climate change mitigation policy support behaviour. The full-mediating effects of policy effectiveness support the fundamental propositions of EPPM. That is, perceived risk is necessary because it provides individuals with a rationale through which to consider the process of risk amelioration. However, the effectiveness of proposed risk ameliorating solutions is critical in persuading individuals to engage in behavioural change. Should one remove policy effectiveness from the framework the motivating effect of the perceived adverse impacts of climate change on policy support will not be forthcoming. The full-mediating effects of perceived policy effectiveness (PE) on the relationship between perceived adverse impacts of climate change (PI) and mitigation policy support (PS) is implied in this scenario.

Furthermore, this study detects a partial-moderating effect of PE on the link between PI and PS when examining behavioural policies. The partial-mediating effect indicates that the PI construct does affect PS with or without the presence of the PE construct. Does this evidence undermine the EPPM? This study postulates that it does not, but instead, that the evidence of the partial-moderating effect enhances the RPA and therefore the EPPM.

Table 7: Moderating effect results (The general public sample)

	Dependent variable: Support for Behav. policies	**Dependent variable: Support for Structural policies**	
	Model 9 Beta[a, b] (S.E.)	Model 10 Beta[a, b] (S.E.)	Model 11 Beta[a, b] (S.E.)
(Constant)	3.30*** (.11)	2.22*** (.14)	2.34*** (.14)
Perceived adverse impacts of climate change – *Low-critical* **(PI-LOCR)**	.10*** (.03)	.00 (.03)	.01 (.03)
Perceived adverse impacts of climate change – *High-critical* **(PI-HICR)**	-.09*** (.02)	.05 (.02)	.05 (.02)
Perceived anthropogenic causes of climate change **(PA)**	.02 (.01)	.06*** (.02)	.06*** (.02)
Perceived Effectiveness – *Behavioural policies* **(PE-BEH)**	.30*** (.02)	-.20*** (.02)	-.20*** (.02)
Perceived Feasibility – *Behavioural policies* **(PF-BEH)**	.04* (.02)	.02 (.02)	.02 (.02)
Perceived Effectiveness – *Structural policies* **(PE-STR)**	-.08*** (.02)	.76*** (.02)	.76*** (.02)
Perceived Feasibility – *Structural policies* **(PF-STR)**	.03 (.02)	.07*** (.02)	.06*** (.02)
PE-BEH x PI-LOCR	-.02 (.02)		
PE-STR x PI-LOCR		-.14*** (.02)	
PE-STR x PI-HICR			-.12*** (.02)
Demographics			
Gender (female=1)	-.02 (.02)	.02 (.03)	.02 (.03)
Age	.08*** (.01)	.04*** (.01)	.04*** (.01)
Education	.02 (.01)	.02* (.01)	.02 (.01)
Income	-.02 (.01)	-.02 (.01)	-.02 (.01)
Full-time	-.07 (.05)	.00 (.05)	.00 (.05)
Part-time	-.11* (.05)	-.06 (.06)	-.06 (.06)
Unpaid jobs	-.06 (.05)	-.01 (.06)	.00 (.06)
Retired	-.09 (.05)	-.02 (.06)	-.01 (.06)
Labour Party	.06 (.04)	.13*** (.04)	.14*** (.04)
Liberal Party	-.04 (.04)	-.07 (.04)	-.06 (.04)
National Party	-.09 (.08)	-.12 (.09)	-.10 (.09)
Green Party	.11* (.05)	.15* (.05)	.14* (.05)
Independent Party	.02 (.05)	-.01 (.06)	-.01 (.06)
F (df1,df2)	29.82 *** (21,1454)	115.29*** (21,1454)	115.06*** (22,1454)
R-square	.30	.62	.62
Adjusted R-square	.29	.61	.61
Change statistics [c]			
R-square change	.00	.04	.01
F change *(df1,df2)*	1.19 (1, 1454)	40.67*** (1,1454)	38.86*** (1,1454)

[a] Unstandardised coefficients, independent and moderating variables were mean-centred, n = 1,476
[b] *p < .05, **p < .01, ***p < .001, all are two-tailed tests
[c] Compared to the model without the interaction terms; S.E.= Standard Error

The EPPM does not take into account the behavioural or structural nature of the proposed responsive solutions for example, whether or not individuals need to make sacrifices. Moreover, empirical studies of the EPPM, mostly in the field of health communication, have presented solutions that require individuals to sacrifice to some extent. Examples are safe sex practices to reduce the risk of HIV (Witte 1994), use of sunscreen to reduce the risk of skin cancer (Rimal & Real 2003), and use of hearing protection (Smith et al. 2008). The cost of condoms, sunscreen or hearing protection devices are examples of the financial sacrifice individuals need to make. Furthermore, there could be other inconvenient measures that individuals need to take to guarantee as far as possible, protective solutions. In those self-sacrificing examples, individuals need to consider the effectiveness of the proposed solutions as part of their decision-making.

The critical role of response effectiveness when examining self-sacrificing solutions was found when examining public support for structural policies. In the context of climate change, structural policies require individuals to sacrifice, as with carbon taxes. Through applying cost-benefit analysis, individuals are likely to sacrifice and support structural policies once they believe in the initiatives' effectiveness in mitigating the impacts of climate change. Furthermore, the lack of effectiveness of structural policies will not trigger behavioural change even if individuals are already aware of some adverse impacts of climate change. Conversely, behavioural policies do not require the individual to sacrifice. Occasionally, those policies provide incentives to individuals for example, subsidies for solar energy systems. As an outcome, some individuals may support behavioural policies because they believe in the adverse impacts of climate change, even if they do not believe the policies are

sufficiently effective. This could explain the partial mediating effect found by the study.

Therefore, this study enhances the RPA framework and the original EPPM by including a description of responsive solutions. That is, responsive efficacy fully mediates the link between perceived risk and behavioural intention or behavioural change, if the proposed responsive solutions require individuals to sacrifice. Conversely, if the responsive solutions are behavioural, then the mediating effect could be partial.

This study only partially endorses the moderating effect proposal. The adverse impacts of climate change were found to moderate the relationship between the effectiveness of structural mitigation policies and support for them. However, the moderating effect was not found in the case of behavioural policies. Furthermore, the identified moderating effects contradicted EPPM propositions. That is, climate change adverse impacts weaken the link between policy effectiveness and support behaviour, while the EPPM proposes the opposite (Witte 1992).

Perceived risks from climate change are different to anticipated health problems, as the former is believed to impact not only individuals, but also entire communities (Linden & Sander 2014). Consequently, individuals may believe that governments and other stakeholders such as business and industry are also responsible for mitigating climate change (Lorenzoni, Nicholson-Cole & Whitmarsh 2007, p. 451). This fundamental difference could help explain contradictory findings regarding the moderating effects. It is suggested that a high level of perceived risk encourages individuals to direct responsibility for climate change mitigation onto stakeholders such as business and industry. Furthermore, the belief in the effectiveness of climate

change mitigation policy may reflect the individual's belief in the extent to which government is responsible for those initiatives. Consequently, it could explain the reason that the adverse consequences of climate change reduce the impact of policy effectiveness on public support. If the public perceives climate change could cause catastrophic effects, it is likely to believe government actions are inadequate and that other stakeholders should be involved.

It is important to remember that the moderating effects are only found with regard to structural policies and not behavioural policies. This study asserts that the fundamental difference between the two domains of climate change mitigation policies combined with the individuals' cost-benefit analysis might explain this contradiction. A negative cost-benefit result might eventuate should individuals choose to support structural policies. It is possible that a "pass the buck" reaction might occur should individuals believe that the risk from climate change is high. This informs the moderating effect of adverse climate change impacts that is apparent in relation to structural policies. On the contrary, support for behavioural policies could lead to a positive result regarding a cost-benefit comparison because individuals are not asked to sacrifice. Therefore, "passing the buck" behaviour may not occur and consequently, the relationship between policy effectiveness and support behaviour will be unencumbered by the adverse impacts of climate change.

4.6 General Discussion and Marketing Implications from Chapter Three and Chapter Four

Chapter Three suggested that policy effectiveness plays a dominant role in explaining public support for climate change mitigation policies. This however raises important questions regarding the manner through which this mechanism occurs (Bostrom et al. 2012). Chapter Four's findings regarding the mediating effect offer some explanations to these questions.

Chapter Four suggests that policy effectiveness mediates the relationship between the adverse impacts of climate change and public support for the relevant policies. This again highlights the important role of policy effectiveness in encouraging public support for mitigation policies. The construct of policy effectiveness has full-mediating effects in the example of structural climate change mitigation policies. This implies that policy effectiveness is key to encouraging people to sacrifice to mitigate climate change. Consequently, policymakers should focus on this important construct if they want to inspire the public to support structural solutions such as the carbon tax.

In summary, the findings gained from Chapter Three and Chapter Four suggest that the dominance of perceived policy effectiveness is two-fold. The first is the direct effect of the determinant on individuals' support for mitigation policies. The second through the mediating effect it has on the link between perceived adverse impacts of climate change and policy support. It is important to note that this study examined a sample of climate change believers (CCBs) who are likely to have a high awareness of human-induced climate change and its adverse impacts. Therefore, it is suspected that the roles of PI and PA may be saturated once individuals are CCBs. In other

words, given the high levels of PI and PA of CCBs examined in this study, it is possible that further increasing their perception of climate change risks may not significantly enhance these CCBs' support for mitigation policies. Instead, Hine et al. (2013) recommend that communicating effectiveness of mitigation actions should be the key to encouraging "alarmed" audiences (the group that mostly accept the existence of climate change and perceived its adverse impacts) to support mitigation initiatives. Chapter Four's findings may offer empirical support for this recommendation. It therefore argued that once individuals perceive sufficient levels of adverse impacts of climate change, and believe in the anthropogenic causes of climate change (e.g., being CCBs), PE should be more emphasised to further garner public support for mitigation policies.

However, should we dismiss the role of the adverse impacts of climate change in persuasive discourse given the dominant role of policy effectiveness? The answer is that we should not. Risk perception is important as it captures the public's attention about climate change issues (Linden & Sander 2014). Individuals tend to support regulations once they believe that risk is high (Slovic 1987). This study therefore asserts that the influences of PI and PA are still critical when examining the general public's support for mitigation policies, and therefore the two drivers should not be disregarded. Previous climate change audience segmentation research consistently found that individuals who are most supportive of mitigation policies also possess strong beliefs in the existence of climate change, its human causality and adverse impacts. For instance, Hine et al. (2013) in their study of 3,096 Australian participants, found that a majority of climate change believers (88% of them, which was 64.9% of the whole sample) expressed above-average levels of perceived risks of climate change, and are also likely to show significantly higher levels of support

for mitigation initiatives than climate change sceptics. Similarly, a study by Maibach et al. (2011) found that the two most supportive groups (51% of 2,164 American participants) for mitigation policies held substantially higher levels of belief in the existence of human-induced climate change and in the perceived risks from it.

Policy effectiveness is a dominant driver. However, there are cases whereby the adverse impacts of climate change might directly affect public support for mitigation policies. This is apparent once policy effectiveness partially mediates the link between adverse impacts of climate change and support for mitigation policies. In fact, the indirect effect of the adverse impacts of climate change on support for behavioural policy is considerably less than the construct's direct effect on the dependent variable (indirect effect = .04, *SE* = .01; direct effect = .11, *SE* = .02).

Given the important role of perceived adverse impacts of climate change, this study urges for continued efforts in increasing the general public's awareness of climate change and of its adverse impacts. Climate change believers (CCBs), who believe in the existence of human-induced climate change and its adverse impacts, are the individuals who are most willing to take active mitigation actions, it is therefore important to encourage individuals to join this segment of the climate change audience (Hine et al. 2013) by raising the broader public's awareness of climate change issues.

This study nevertheless found that scaring people, the "fear appeal" communicative approach, could result in failure (Linden & Sander 2014), even if risk ameliorating solutions are promoted. Shome et al. (2009) argued that excessive communication of factors such as fear or worry leads to emotional numbing; individuals no longer emotionally react to climate change issues as risks, which may limit responsive

behaviour. Moreover, from the current study's example of structural climate change mitigation policies, the high level of adverse impacts is found to weaken the relationship between policy effectiveness and public support. Although this is not found when examining behavioural policies, policymakers should be cautious in using the "fear appeal" approach when seeking public support for structural policies such as the carbon tax. High levels of perceived risks could harm the positive impact of policy effectiveness on public support for structural policies.

In conclusion, perceived policy effectiveness and adverse impacts of climate change are important in encouraging public support for mitigation policies. However, further attention is needed on policy effectiveness because its role is critical in driving public support. Moreover, it cannot be denied that communicating the adverse impacts of climate change is necessary because it captures public attention. Nevertheless, directing the public towards the impacts of adverse climate change could also have negative implications. This may include reducing the positive effect of policy effectiveness on public support. Furthermore, it is important to state that a trade-off between public support for structural policies and for behavioural policies may eventuate if the sole focus is on the high-critical aspects of climate change impacts. Chapter Three found the high-critical aspect of the adverse impacts of climate change could enhance public support for structural policies, and at the same time, decrease support for behavioural policies.

CHAPTER FIVE

PUTTING EXPERTS INTO LAY PEOPLE'S SHOES – WHAT DRIVES CLIMATE SCIENTISTS TO SUPPORT CLIMATE CHANGE MITIGATION POLICIES?

5.1 Overview

Climate change is one of our major contemporary challenges, and we rely on our scientists' knowledge and recommendations to tackle it. However, the role of scientists' voices in mitigating climate change is curbed because of the nonlinearity of climate change communication. The literature has targeted a consequence of this problem, "knowledge gaps" between climate scientists and lay people, to improve public engagement in climate change issues. However, other important gaps between the two groups should also be examined. This study endeavours to look beyond the knowledge gap to attitudinal differences between the two samples. Comparing a sample of 1,476 lay participants to a group of 140 climate scientists, all Australian, this chapter describes major differences in their perceptions of adverse impacts of climate change; evaluations of mitigation policies; and policy preferences. Drawing on the analytical framework developed in Chapter Two, this chapter studies the drivers of support for mitigation policies of assumed "bias-free" individuals such as the scientists. This chapter offers a number of suggestions for more effective climate change communication. For instance, focusing on the adverse impacts of climate change on human wellbeing, and on policy effectiveness, might enhance public

support for both mandatory and voluntary mitigation initiatives. The data also suggest that from the perspective of climate scientists, to mitigate severe adverse impacts of climate change such as sea-level rises, sacrifice-requiring mitigation initiatives should be implemented. Marketing implications also are discussed.

5.2 Introduction

We rely on psychological factors, such as feelings, to cope with risks that we have previously experienced. However, in the case of risks posed by climate change, with many uncertainties, we count on cognitive or rational elements to know and thereafter respond to the risks (Slovic et al. 2004, 2005). Scientists supply the knowledge and therefore play a critical role in guiding us through the not-fully known risks. Most of society's movements towards tackling climate change, which include the general public's attitudes and political initiatives, are initiated by scientific facts and recommendations. The carbon tax and Emissions Trading Scheme (ETS) in Australia and similar schemes in many other nations were based on rationales from influencing literature such as the Stern Review (Stern 2006) and the Garnaut Report (Garnaut 2008). Studies of consumer perceptions of the issue suggest that the general public considers climate scientists to be the most trusted source of climate change information (Buys et al. 2012; Leviston & Walker 2011b). However, the Australian general public seems not to fully favour their scientists' advice on climate change mitigation. Australian experts such as Garnaut (2008) recommend carbon pricing as a solution to mitigate climate change, based on the general agreement that carbon pricing is amongst the most effective market-based tools to

curb carbon emissions (Elkins & Baker 2001; Stern 2006). Nevertheless, more than half of the Australian public did not want the government to maintain carbon pricing (Connor & Stefanova 2013). This is possibly a sign that the general public and climate scientists may not agree on what climate change mitigation actions to support.

There is a general agreement in the literature that there are knowledge and attitudinal gaps between lay audiences and climate scientists (Bostrom et al. 1994; Sterman & Sweeney 2007; Sundblad, Biel & Gärling 2009) due to the nonlinearity in climate change communication (Sundblad, Biel & Gärling 2009; Weingart, Engels & Pansegrau 2000), with the results that these gaps might lead to divergences between the two samples in mitigation behaviours (Kollmuss & Agyeman 2002). However, very little is known about the extent to which these gaps explain disagreements between the two groups about their attitudes towards mitigation policies and their policy preferences. Therefore one objective of this chapter is to examine the knowledge and attitudinal gaps between the two groups.

5.2.1 The "knowledge gap" between the general public and scientists

The general public's perceptions about climate change and mitigation actions are formed by multiple sources of information. Weingart et al. (2000) identify the three most important stakeholders in climate change communication: scientists, politicians, and journalists. The authors argue that climate change information is imperfectly transferred through these three "spheres" of influences, with the tendency amongst policy makers to simplify climate science findings, and the media to only report newsworthy information. Consequently, the original climate change related scientific

information is distorted through communication by the time it reaches the general public (Stoutenborough & Vedlitz, 2014; Weingart et al., 2000). It can therefore be argued that lay audiences probably conceptualise climate change differently from climate scientists, and consequently, the two groups are likely to differ in climate change knowledge, attitudes about climate change, and preferred responsive actions.

The literature has reported "knowledge gaps" between the general public and scientists. Kempton (1991) found many differences in knowledge and understanding of climate change between the US lay people and scientists. Whilst the scientists clearly believed CO_2 emissions were one of the causes of the greenhouse effect, lay people did not recognise this fact. The US public at that time believed that aerosol spray cans, the ozone hole, cutting trees and air pollution were associated with climate change when scientists did not. Bostrom et al. (1994) found a similar pattern. Their study of 177 well-educated participants revealed that the participants associated the ozone layer with global warming, and did not recognise that fossil fuel consumptions are the most significant source of carbon emissions. Instead, 38% of the sample believed the use of aerosol cans contributed to climate change.

These knowledge gaps are critical as they affect responding behaviours towards climate change (Kempton, 1993). Inadequate understanding about the causes and mechanisms of climate change is reflected in 28% of the participants in Bostrom et al. (1994) suggesting that CFCs restriction was among the most effective way to mitigate global warming. Nine years later, 46% of Americans still avoided purchasing aerosol spray cans if they were concerned about climate change (Leiserowitz 2007). The differences in climate change knowledge can also lead to gaps in policy preferences between the general public and scientists. Kempton (1991)

found that in the US, lay people believed that energy efficiency was irrelevant to carbon emission reductions.

In conclusion, the imperfect flow of climate change information from climate scientists to the general public has created many barriers in resolving one of our contemporary challenges—climate change. The knowledge gaps discussed above can impede the communication of scientific facts and recommendations for improving our mitigation efforts (Sterman 2011). It is therefore essential to reduce climate change "knowledge gaps" between lay people and experts. Consequently, many studies have contrasted the general public and climate scientists to explore differences in climate change knowledge and understanding between the two samples (Fransson & Gärling 1999; Kempton 1993; Kollmuss & Agyeman 2002; O'Connor et al. 2002; Sterman & Sweeney 2007; Viscusi & Zeckhauser 2006).

5.2.2 What about the other gaps?

It is inadequate, however, to only focus on climate change knowledge differences when seeking to explain the behavioural gaps between scientists and lay people (Linden & Sander 2014). Kollmuss and Agyeman's (2002) Knowledge-Attitude-Behaviour (KAB) model demonstrates that knowledge does not directly influence behaviour, but that the effect is mediated by an attitudinal factor. Similarly, the Theory of Planned Behaviour also emphasises the role of attitude in determining behavioural intentions and thereafter behavioural changes (Ajzen 1991). Consequently, detecting differences in other factors such as attitude, rather than only knowledge, is equally important for developing better climate change communication modes (Maibach, Roser-Renouf & Leiserowitz 2008; Shome, D. et

al. 2009). This study fills this gap by contrasting the attitudes of the two groups, lay audiences and climate scientists, regarding climate change issues such as the perception of adverse impacts of climate change, and evaluations of climate change mitigation policies. Furthermore, this study examines a behavioural gap between the two samples by comparing their mitigation policy preferences. Examining these divergences in policy evaluations and policy preferences will provide evidence of the nonlinearity in climate change communication, and therefore is valuable in evaluating and enhancing our so-far climate change communication efforts.

This chapter aims to investigate differences between lay people and climate scientists in their attitudes towards climate change and mitigation policies, and their support level for these initiatives. This is to examine the Research Question Four of this thesis (see Chapter One):

> *What are the differences between the general public and climate scientists in attitudes towards climate change, evaluation of climate change mitigation policies, and support for them?*

The above research question consists of the following sub-research questions:

(i) What are the differences in perceived adverse impacts of climate change, and in the evaluations of climate change mitigation policies between the general public and climate scientists?

(ii) What are the differences in mitigation policy preferences between the general public and climate scientists?

5.2.3 Why does this study put experts into lay people's shoes?

The literature suggests that the barriers of self-interest preservation behaviour, and inadequate knowledge, might most significantly refrain individuals from engaging in appropriate climate change mitigation actions. Aitken et al. (2011) found that the perception of common dilemma is the most significant factor weakening New Zealanders' willingness to take mitigation actions. Individuals are less likely to sacrifice to mitigate climate change if they believe that others will not make similar efforts, as individuals tend to maximise their personal interest (Wiener & Doescher, 1991). Climate change adversely affects every member of the society, however, only those who choose to take mitigation actions bear the cost of doing so (such as financial cost for solar energy systems, inconveniences of using public transport). Therefore, choosing not to voluntarily act towards climate change may be a preferred strategy to maximise personal interest. Lorenzoni et al. (2007) identified the same barrier in the "free-rider effect" which refrained the UK public from taking mitigation actions. These findings suggest that self-interest prioritising behaviour may significantly curb the effects of mitigation behaviour's determinants. The other reason cited for not taking voluntary action to support climate change mitigation is a lack of knowledge about the issue, which can act as a barrier to individuals taking appropriate mitigation actions (Bostrom et al., 1994; Kempton, 1991; Leiserowitz, 2007; O'Connor et al., 2002; J. Sterman & Sweeney, 2007). Individuals may sometimes take irrelevant actions to mitigate climate change such as boycotting spray-cans if they believe aerosols contribute to climate change (Bostrom et al., 1994; Leiserowitz, 2007).

Climate scientists are good candidates who may satisfy the assumption of bias-free individuals in areas such as political and personal interests. Moreover, they are possibly the most knowledgeable group regarding climate change that we can examine. Understanding the drivers that influence this group's policy preferences is valuable. Examining this sample may offer insights into mitigation behaviour in a rare case where the two common barriers of the behaviour – inadequate climate change knowledge, and personal-interest preservation – are likely to be minimised. Moreover, this study expects suggestions from the scientists to most effectively mitigate climate change via policy instruments when studying their mitigation behaviour.

This chapter therefore applies the analytical framework developed in Chapter Two to study the impacts of four factors on the scientists' climate change mitigation policy support behaviour: perceived adverse impacts of climate change; perceived anthropogenic causes of climate change; perceived policy effectiveness; and feasibility. The direct influences of the four drivers on the scientists' policy support are backed by the Risk Perception theory(Slovic 1987; Slovic et al. 2005), the Theory of Planned Behaviour (Ajzen 1991), and Social Dilemma literature (e.g., Wiener & Doescher 1991). Drawing on the Extended Parallel Process Model (EPPM) (Witte 1992) and the Risk Perception Attitude framework (Rimal & Real 2003), this chapter investigates the mediating and moderating mechanisms through which the perceived adverse impacts of climate change, and perceived policy effectiveness drive policy support. This is to investigate the Research Question Five of this thesis (see Chapter One):

What drives climate scientists' support for climate change mitigation policies?

This research question consists of the following sub-research questions:

(iii) Which of the four drivers most greatly influences mitigation policy support?

(iv) Is perceived policy effectiveness a mediator of the link between perceived adverse impacts of climate change and mitigation policy support?

(v) Is perceived adverse impacts of climate change a moderator of the link between perceived policy effectiveness and mitigation policy support?

Similarly to Chapter Three and Four, this chapter also examines the extent to which the basic characteristics of mitigation policies, as suggested by the Social Dilemma literature (Wiener & Doescher 1991), influences the four drivers' impacts on the scientists' policy preferences.

The contribution of this study is twofold. Firstly, this study offers insights that can improve climate change communication. These insights result from examining important differences in attitudinal factors and policy preferences, rather than the common knowledge gaps, between the general public and climate scientists. Secondly, considering climate scientists are bias-free individuals, lessons learned from them may help us more efficiently encourage policy support and therefore better mitigate climate change impacts.

The following section describes the methodology and data collection. This chapter then contrasts survey data from the general public and climate scientists to

investigate the differences in attitudes towards climate change, and mitigation policies. Empirical tests are provided to examine the direct effects, and moderating and mediating hypotheses. Theoretical and practical implications of this study are also discussed.

5.3 Methodology

5.3.1 Participants

A web-based survey instrument was developed to collect the data for this study. The main content of the questionnaire is similar to the survey instrument developed for the sample of the general public (please refer to the methodology section of Chapter Three). The major difference between the two questionnaires is in the demographics that were collected.

Using an internet search engine with relevant keywords, email addresses of climate scientists from Australian universities and research institutes were collected. The link to the web-based questionnaire was then sent to the collected email addresses. Between May to July 2012, 144 responses from the sample of climate scientists were received. In this sample there were three "non-believers" who did not believe that climate change had or will happen in the previous or the next five years. One response was classified as "part-believer", as this climate scientist believed in the existence of climate change in the past five years, but did not think that climate change will happen in the next five years. Given that the numbers of "non-believers" and "part-believers" of climate change in the sample are low, this study excluded

these two types of responses. Consequently, this study analysed a final sample of 140 participants. Among them 72.1% were male, 34.3% aged from 40 to 59, 71.4% based in the three most populous states of Australia: New South Wales, Victoria, and Queensland. 42.1% and 29.3% had expertise in physical sciences and social sciences, respectively (Appendix 4).

5.3.2 Measures

This study measures perceived adverse impacts of climate change by using a scale of nine items. These items were adopted from Bostrom et al. (2012), and O'Connor et al. (1999, 2000) but were subsequently modified for relevancy to the Australian context (e.g., Kevin 2011; Preston & Jones 2006) (Table 8). The participants were asked to evaluate their beliefs in the adverse impacts of climate change over two time frames: the last five years and the next five years. This study also gauged the climate scientists' belief in the anthropogenic causes of climate change.

Climate scientist participants were also asked to give their opinion on ten climate change mitigation policies in two facets: policy effectiveness and feasibility (Table 9 and 10). Finally, this study asked the participants to rate each of the policies. The above four scales were all measured using five-point Likert scales. *Ones* anchor the lowest level whilst *fives* indicate the highest level of beliefs (in the adverse impacts of climate change, anthropogenic causes of climate change, policy effectiveness, policy feasibility) and policy support.

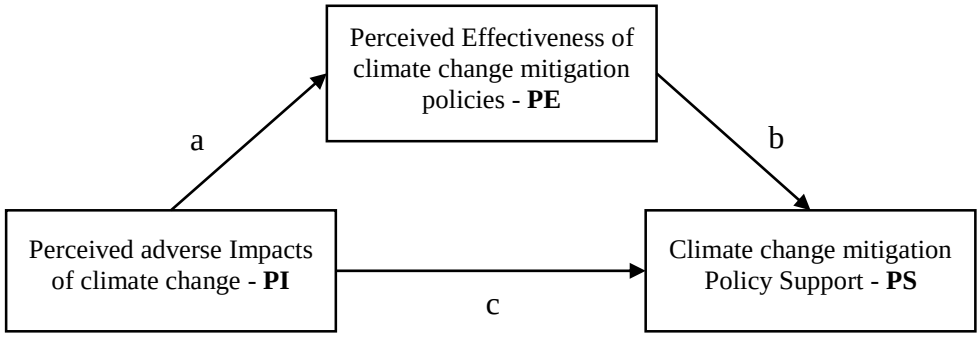
5.3.3 Data analysis

This chapter firstly compared the survey data of the two groups, the general public and climate scientists, to examine differences in their attitudes towards climate change and mitigation policies. Specifically, this chapter contrasted the two groups for differences in their perceptions of adverse impacts of climate change, mitigation policy evaluations, and policy preferences. In order to directly compare the two samples' survey results, similar survey questions were drafted for both surveys.

The next step of data analysis was reducing the complexity of the multiple-item scales by employing factor analyses. From this step, sub-scales were established and checked for internal validity. Items in those sub-scales were thereafter aggregated to form single scores. This study then employed the Ordinary Least Square (OLS) regression method to investigate direct impacts of the four determinants on policy support. The OLS based PROCESS macro (Hayes 2012, 2013) was employed to test the hypotheses of moderating and mediating effects. This study conducted all the regressions with SPSS statistical software version 21 (IBM Corp. 2011).

This study tested the mediating effects by three steps to identify direct and indirect effects of the independent variable (PI) on the dependent variable (PS) through the mediator (PE) (Hayes 2012) (Figure 10). First, path *a* was identified by a single regression analysis in which PE was the dependent variable and PI was the independent variable. Second, a multiple regression analysis in which PS was explained by PI and PE was conducted to examine direct effects of PI and PE on PS (paths *b*, *c*).

Figure 10: Mediating effect testing framework



The mediating effect was proven if path *a* and *b* were statistically significant (MacKinnon, Fairchild & Fritz 2007). PE fully mediated the PI – PS link if the path *c* was statistically insignificant otherwise a partial-mediation effect was detected. A full-mediating effect implies that the independent variable cannot affect the dependent variable without the mediator's presence. A partial-mediating effect means that the independent variable affects the dependent variable in both ways: direct (without the mediator) and indirect (through the mediator). Finally, if the mediating effect was proven, then the indirect effect of PI on PS was identified by the bias-corrected bootstrap approach with 10,000 bootstrap samples (Hayes 2013, p. 111; Hayes & Scharkow 2013).

Testing the moderating effect of the hypothesis was conducted by the OLS-based multiple regression method using the PROCESS macro (Hayes 2012). The test consisted of two steps. First, the independent (PE) and moderating (PI) variables were introduced to explain the dependent variable (PS). Second, the interaction term of PE and PI was included with PE and PI to predict PS. To conclude that the moderating effect exists, the coefficient of the interaction term and R-square change are required to be statistically significant. Independent and moderating variables

were mean-centred before the regression analyses for ease of later interpretation (Dalal & Zickar 2012).

5.4 Results

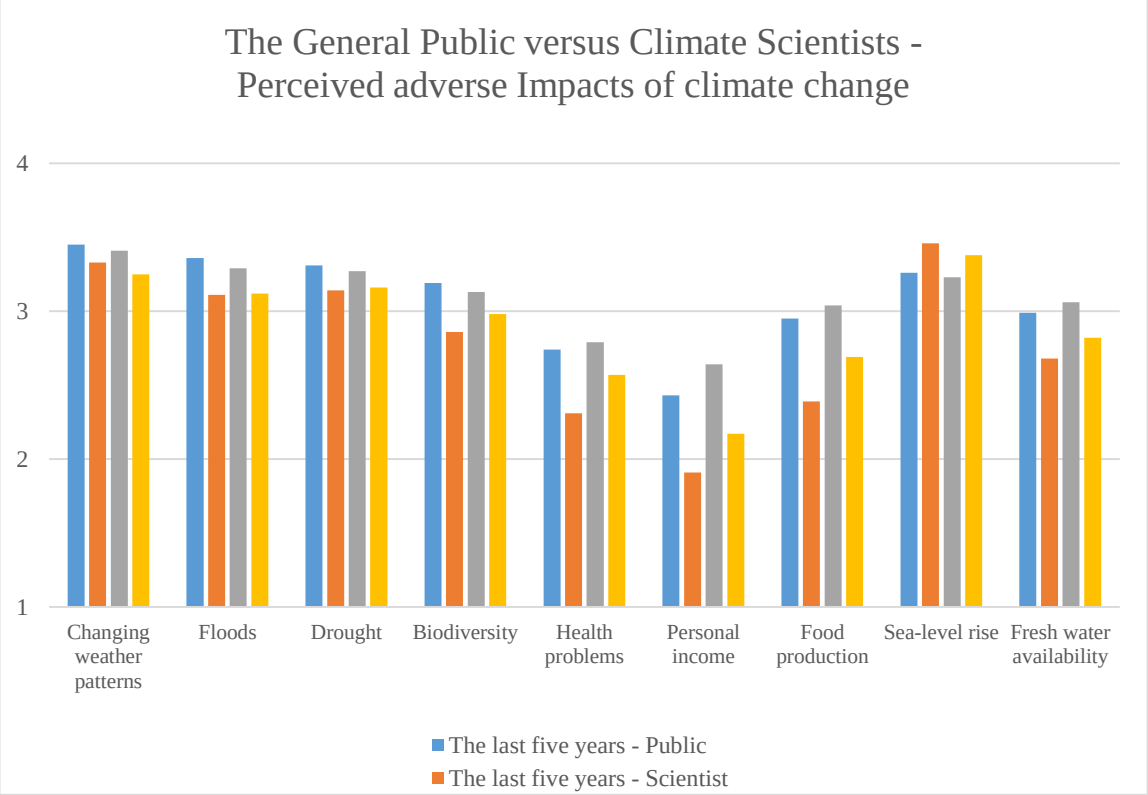
5.4.1 Descriptive analyses

This section considers overall differences in responses from climate scientists and the general public. It draws on the survey outlined above, as well as earlier work applying a similar survey to 1,476 members of the general public. This section focuses on the differences in perceptions of adverse impacts of climate change, policy evaluations, and policy preferences between these two groups.

5.4.1.1 Differences in the perceptions of adverse impacts of climate change

The graph below (Figure 11) contrasts the beliefs of the general public and of climate scientists regarding nine adverse impacts of climate change in two time frames: the last five years and the next five years. The survey questions read 'To what extent do you think climate change has been a cause of the following possible outcomes over the past five years?', and 'To what extent do you think climate change has been a cause of the following possible outcomes over the next five years?' *Ones* indicate the lowest and *fives* anchor the highest level of agreement with the statements (1 = 'Not at all'; 3 = 'Moderately'; 5 = 'Totally').

Figure 11: Differences in perceptions of adverse impacts of climate change



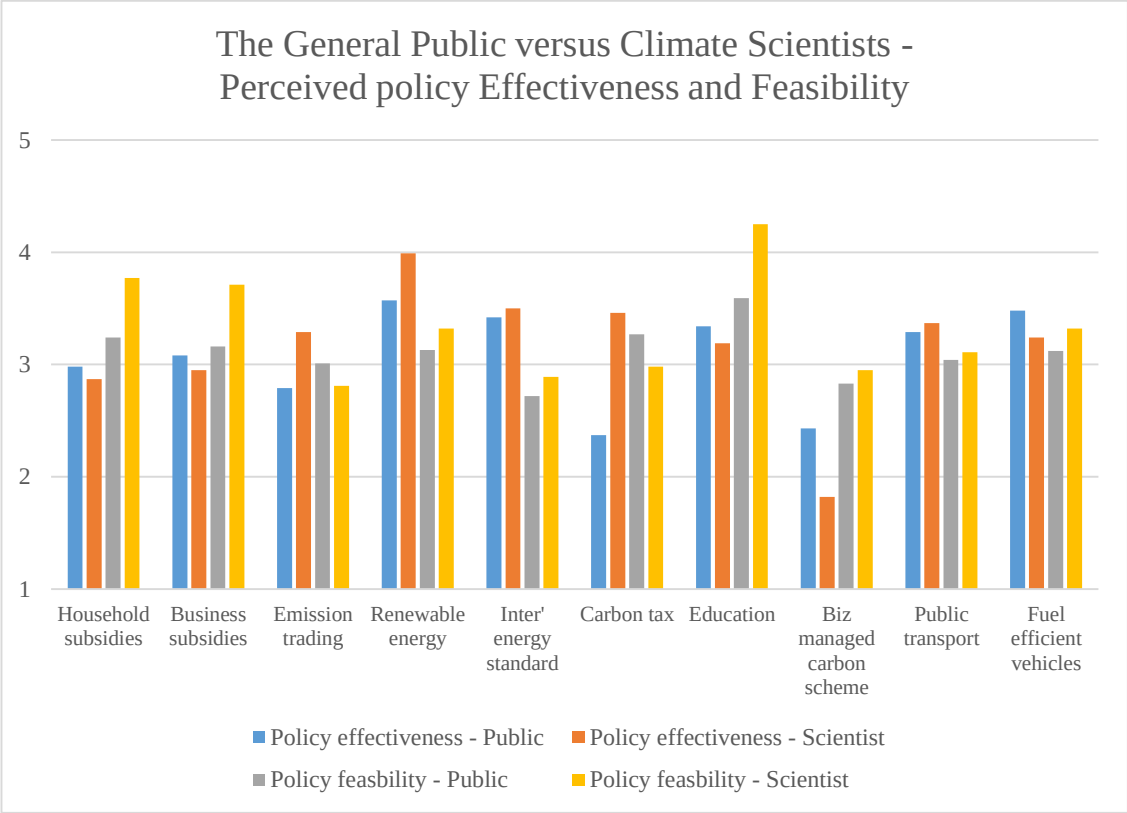
The results show that the general public have consistently higher mean scores for their perceptions of the adverse impacts of climate change in relation to both time frames (Figure 11). The only exception to this pattern is the sea-level rise impact where the general public under-estimate the risk of climate change in terms of sea-level rises compared to climate scientists. The biggest differences between the two samples' perceptions of the adverse impacts are found in the high-critical and direct destructive influences of climate change on human wellbeing such as health, income, and food and water availability. The general public are more concerned about these impacts than scientists are.

5.4.1.2 Differences in evaluations of climate change mitigation policies

This study also compares the general public and climate scientists for differences in their evaluations of climate change mitigation policies in two aspects: policy effectiveness, and feasibility. The survey questions and anchors were similar in the two surveys: 'How effective do you think that the actions and policies below could be in helping to prevent global climate change?' (1 = 'Not at all effective'; 3 = 'Moderately effective'; 5 = 'Totally effective'); and 'How difficult do you think it would be to get action undertaken on each of the following possible activities?' The survey results of this question were reverse-coded for ease of later interpretation (final anchors are: 1 = 'Not at all feasible'; 3 = 'Moderately feasible; 5 = 'Totally feasible').

Policy effectiveness As demonstrated in Figure 12, both samples perceive renewable energy investment as the most efficient action to mitigate climate change. The three most effective policies from the perspective of the general public are renewable energy investment, investment in fuel efficient vehicles, and international energy efficiency standards. On the other hand, the three most effective policies ranked by climate scientists are renewable energy investment, international energy efficiency standards and the carbon tax. However, the carbon tax is perceived as the least effective initiative for mitigating climate change from the lay perspective. Meanwhile, the least effective mitigation action from the perspective of scientists is a business-managed carbon scheme.

Figure 12: Differences in evaluations of climate change mitigation policies



Policy feasibility There are many similarities in the perceptions of policy feasibility between the two samples. The general public consider education, the carbon tax, and subsidies for more energy efficient household appliances to be the three most feasible policies. They also believe that the least perceived feasible policy is international standard for energy efficiency. The scientists believe that education initiatives, subsidies for households, and for businesses are the three most feasible policies. The emissions trading scheme is believed to be the most difficult policy to implement, whilst the international energy standard is second, and the carbon tax the third least feasible mitigation initiative (see Figure 12).

Both samples agree then that the two least feasible actions are international energy efficiency standards and the emissions trading scheme. The biggest difference in the

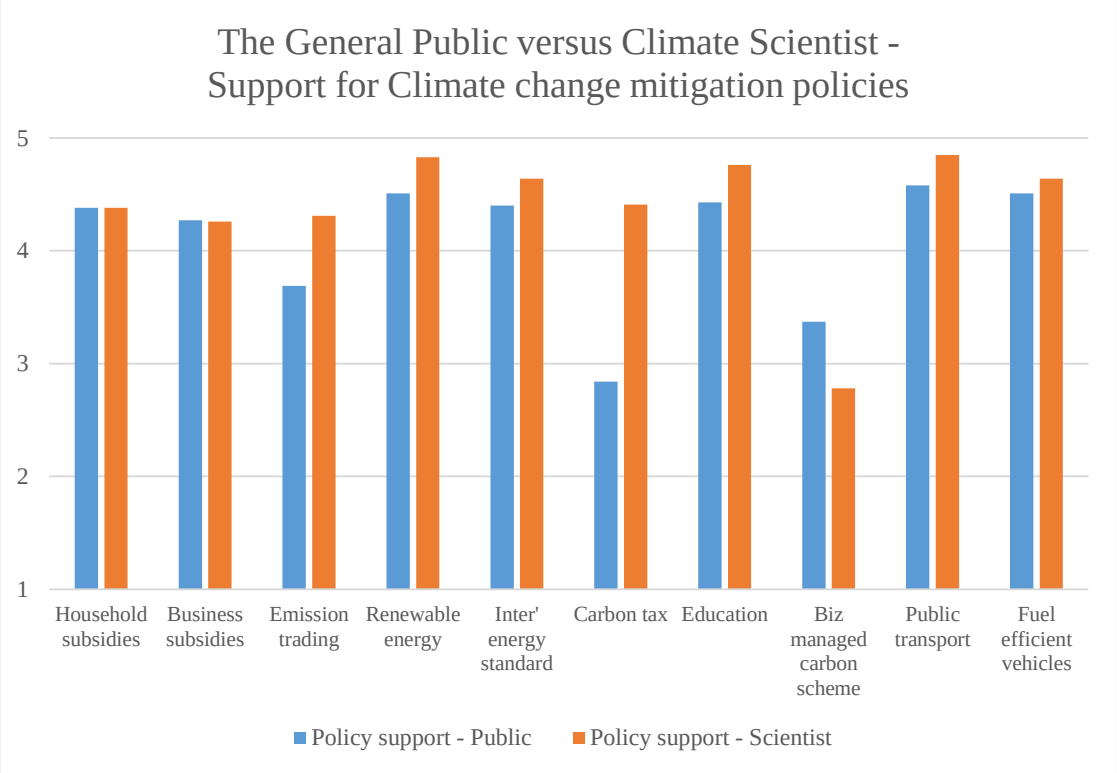
feasibility aspect is the evaluation of the carbon tax. Whilst lay people believe the carbon tax is among the easiest mitigation initiatives to implement, the scientists rank it as the seventh out of the ten policies in question.

5.4.1.3 Differences in mitigation policy preferences

This study found differences between the general public and climate scientists in their evaluations of mitigation policies in term of policy effectiveness and feasibility, especially in relation to the particular policy of the carbon tax. Is a similar pattern observed when examining the two groups' policy preferences? This section compares the general public and climate scientist samples for differences in their mitigation initiative preferences. In both the surveys, the questions read 'We are interested in your level of support for possible actions proposed to combat climate change. To what extent do you support the following activities?' (1 = 'Totally oppose'; 3 = 'Neither oppose nor support'; 5 = 'Totally support').

The results show many similarities in the mitigation policy preferences between lay people and climate scientists (Figure 13). Both the samples support investments in renewable energy, public transport and fuel efficient vehicles as mitigation initiatives. This is aligned with results of the Climate Institute's public opinion poll which was conducted in the same year as this research survey. The Climate of The Nation 2012 report stated that 81% of Australians selected solar power as their most preferred source of energy, 59% of the participant voted for wind, whilst only 14% selected coal (Connor & Stefanova 2012). Similarly, the 2014 Climate of The Nation report recorded that 76% of the general public support government efforts in developing renewable energy, with solar, wind and hydro power alternatives the most preferred (Stefanova 2014, p. 19).

Figure 13: Differences in mitigation policy preferences



However, the largest difference in the level of policy support of the two samples relate to carbon-related initiatives such as the carbon tax, emissions trading scheme, and business managed carbon scheme. Among these, the gap in the carbon tax preferences is the most significant. The general public's support level for the carbon tax policy is below the neutral anchor, which reads 'Neither oppose nor support' (mean = 2.84, SD = 1.53, max = 5.0, min = 1.0). However scientists' support for this initiative is between the 'Somewhat support' and 'Totally support' indicators (mean = 4.41, SD = .99, max = 5.0, min = 1.0). The survey from the Climate Institute indicates that in 2012, the majority of the public (52%) disagreed with the assertion 'I support the carbon pricing laws', with only 28% of the participants agreeing that they support the carbon pricing initiatives (Stefanova 2014, p. 15). This finding

endorses the results of this study regarding the general public's support for the carbon tax.

5.4.2 Exploratory analyses

Exploratory factor analysis was employed to not only to reduce the complexity of the multi-item scales, but also explore the factorial structures of this study's measures. This analysis provides insights into the ways climate scientists conceptualise the adverse impacts of climate change (PI). Examining factorial structures of the policy-related constructs: perceived policy effectiveness (PE); perceived policy feasibility (PF); and policy support (PS), also helps verify the proposition that mitigation policies, from the perspective of climate scientists, can be grouped into two domains as suggested by the Social Dilemma literature (Wiener & Doescher 1991) (see Chapter Two).

5.4.2.1 Perceived adverse impacts of climate change

A factor analysis of the items measuring scientists' beliefs in adverse impacts of climate change yielded three factors. Factor 1 includes impacts that directly influence human's wellbeing in terms of basic needs such as health, food or drinking water. This study labels the factor as *Wellbeing* (PI-WEB). Factor 2 summaries impacts in the form of destructive weather incidences, such as floods or drought. This factor is labelled as *Weather* (PI-WEA). Factor 3 includes only sea-level rises, and therefore is categorised as *Sea-level* (PI-SEA). Those three sub-scales have good internal validity as their Cronbach's Alphas are above the .90 level (Table 8).

5.4.2.2 Attitudes towards climate change mitigation policies

Factor analysis of the ten items measuring perceived policy effectiveness yielded a two-factor result, which is supported by both the scree-plot and Eigen values (Table 9). Analysing the items that measure perceived policy feasibility and policy support, gives a four-factor result as determined by the Eigen values (larger than 1.0) (Table 10, 11). However, the scree-plots suggest that two-factor results are more appropriate representations of the data. Furthermore, factor analyses of PF and PS reveal that the policy of 'A self-regulatory carbon usage scheme managed by business groups' has relatively weak factor loadings (smaller than .30). Consequently, the item was removed from the scales as recommended by Hair (2010).

It is noteworthy that although factor analyses of the PE, PF and PS constructs yielded two-factor results, factors' item memberships are different between the constructs. For the ease of interpretation of later analyses, this study applied the factor-loading pattern that was obtained from the exploratory factor analysis (EFA) of the dependent variable (PS construct) to both PE and PF variables. This approach has been applied in previous studies, such as Bostrom et al. (2012).

Factor 1, which was yielded from the PS's EFA, includes incentivising policies, such as subsidies for more energy efficient household and business equipment, and an education policy to help increase awareness of actions to reduce climate change. Factor 2 summarises policies that require individuals to switch to lifestyles that generate lower carbon emissions, such as the carbon tax, carbon trading scheme and using public transport. The policy of 'International standards for more energy efficient products' has similar factor loadings to both these two factors, therefore it was removed from further analysis due to the cross-loading issue (Hair 2010).

According to the Social Dilemma literature (e.g., Wiener & Doescher 1991), climate change mitigation can be considered a social dilemma, and thus the examined policies can be considered as solutions to that social dilemma. Therefore, they can be classified into two domains: behavioural and structural policies. The former encourages voluntary actions from community members, whilst the latter are mandatory and tend to reduce individuals' freedom of choice with regard to solving social dilemmas (Wiener & Doescher 1991).

Factor 1 of the PS construct captures the domain of behavioural policies, as they do not require individuals to sacrifice their interests to mitigate climate change, but instead provide incentives to do so. Factor 2 summarises mandatory carbon-related policies, which reduce individuals' freedom of choice, in this case to consume fossil fuels as these policies increase fuel costs. The other policies captured by this factor ultimately direct individuals to lower carbon emission modes of transport. Therefore, factor 2 captures the domain of structural policies as postulated by the Social Dilemma literature.

Testing internal validity of the two sub-scales of the policy support construct shows that the above interpretation is valid (Cronbach's Alphas of policy support for behavioural policies – PS-BEH and for structural policies – PS-STR are .75 and .65 respectively). Sub-scales of PE and PF following the same interpretation of PS also have adequate internal validity. Cronbach's Alphas of perceived structural policy effectiveness (PE-STR), behavioural policy effectiveness (PE-BEH), perceived structural policy feasibility (PF-STR), and perceived behavioural policy feasibility (PF-BEH) are .82, .85, .72, and .74 respectively (Hair 2010).

Table 8: Exploratory Factor Analysis Results – Perceived adverse impacts of climate change (PI) (The climate scientist sample)

			PCA factor loadings		
Items (n=140)	**Mean**	**Std. Err**	**Wellbeing**	**Weather**	**Sea-level**
Perceived adverse impacts of climate change in the past five years					
1. Changing weather patterns	3.33	0.09	0.20	**0.84**	0.13
2. Floods	3.11	0.08	0.37	**0.84**	0.13
3. Drought	3.14	0.09	0.33	**0.87**	0.16
4. Biodiversity decreases	2.86	0.09	**0.66**	0.42	-0.02
5. Community health problems	2.31	0.07	**0.75**	0.35	0.08
6. Reduced personal income	1.91	0.07	**0.78**	0.09	0.20
7. Reduced food production	2.39	0.07	**0.78**	0.24	0.02
8. Rise in sea levels	3.46	0.09	0.19	0.24	**0.90**
9. Reduced availability of fresh water for drinking and farming	2.68	0.09	**0.68**	0.43	0.29
Perceived adverse impacts of climate change in the next five years					
1. Changing weather patterns	3.25	0.08	0.29	**0.83**	**0.**23
2. Floods	3.12	0.09	0.36	**0.81**	0.27
3. Drought	3.16	0.08	0.41	**0.84**	0.18
4. Biodiversity decreases	2.98	0.09	**0.63**	0.54	0.05
5. Community health problems	2.57	0.09	**0.76**	0.36	0.20
6. Reduced personal income	2.17	0.08	**0.84**	0.21	0.12
7. Reduced food production	2.69	0.08	**0.82**	0.34	0.20
8. Rise in sea levels	3.38	0.09	0.15	0.22	**0.92**
9. Reduced availability of fresh water for drinking and farming	2.82	0.08	**0.70**	0.44	0.21
Cronbach's Alpha – Full-scale	.96				
Cronbach's Alpha – Sub-scale			.95	.97	.91
% of variance explained – each factor			59.94%	10.08 %	7.73 %
% of variance explained – all factors	77.75%				
Kaiser-Meyer-Olkin (KMO)	.80				
Bartlett's Test of Sphericity	$p < .001(df = 153)$				

Table 9: Exploratory Factor Analysis Results – Perceived effectiveness of climate change mitigation policies (PE) (The climate scientist sample)

			PCA factor loadings	
Items (n=140)	**Mean**	**Std. Err**	**Factor 1**	**Factor 2**
1. Government subsidies for more energy efficient household equipment	2.87	0.09	**0.65**	0.51
2. Government subsidies for more energy efficient business equipment	2.95	0.09	**0.65**	0.50
3. Government support for a Cap and Trade or Emissions Trading Scheme	3.29	0.09	0.19	**0.73**
4. Increased investment in renewable energy	3.99	0.08	0.43	**0.68**
5. International standards for more energy efficient products	3.50	0.09	**0.57**	0.51
6. Introduction of a carbon tax	3.46	0.09	0.09	**0.84**
7. Education about actions to reduce climate change	3.19	0.09	**0.58**	0.37
8. A self-regulatory carbon usage scheme managed by business groups	1.82	0.07	**0.69**	-0.35
9. Improvements in public transport	3.37	0.09	**0.71**	0.38
10. Investment in fuel efficient vehicles	3.24	0.09	**0.74**	0.26
Cronbach's Alpha – Full-scale	.88			
% of variance explained – each factor			50.17%	12.06%
% of variance explained – all factors	62.23%			
Kaiser-Meyer-Olkin (KMO)	.79			
Bartlett's Test of Sphericity	$p < .001(df = 45)$			

Table 10: Exploratory Factor Analysis Results – Perceived feasibility of climate change mitigation policies (PF) (The climate scientist sample)

			PCA factor loadings	
Items (n=140)	**Mean**	**Std. Err**	**Factor 1**	**Factor 2**
1. Government subsidies for more energy efficient household equipment	3.77	0.07	**.85**	-.04
2. Government subsidies for more energy efficient business equipment	3.71	0.07	**.83**	.06
3. Government support for a Cap and Trade or Emissions Trading Scheme	2.81	0.08	.16	**.76**
4. Increased investment in renewable energy	3.32	0.09	.52	**.55**
5. International standards for more energy efficient products	2.89	0.09	**.49**	.26
6. Introduction of a carbon tax	2.98	0.09	-.19	**.74**
7. Education about actions to reduce climate change	4.25	0.07	**.49**	.11
8. A self-regulatory carbon usage scheme managed by business groups	2.95	0.10	.14	.22
9. Improvements in public transport	3.11	0.09	**.45**	.42
10. Investment in fuel efficient vehicles	3.32	0.09	**.57**	.54
Cronbach's Alpha – Full-scale	.75			
% of variance explained – each factor			34.78%	13.49%
% of variance explained – all factors	48.27%			
Kaiser-Meyer-Olkin (KMO)	.69			
Bartlett's Test of Sphericity	$p < .001 (df = 45)$			

Table 11: Exploratory Factor Analysis Results – Support for climate change mitigation policies (PS) (The climate scientist sample)

Items (n=140)	Mean	Std. Err	PCA factor loadings	
			Behavioural policies	**Structural policies**
1. Government subsidies for more energy efficient household equipment	4.38	0.07	**.86**	.15
2. Government subsidies for more energy efficient business equipment	4.26	0.07	**.83**	.14
3. Government support for a Cap and Trade or Emission Trading System	4.31	0.08	-.01	**.72**
4. Increased investment in renewable energy	4.83	0.04	.28	**.64**
5. International standards for more energy efficient products	4.64	0.05	**.44**	.40
6. Introduction of a carbon tax	4.41	0.08	-.21	**.74**
7. Education about actions to reduce climate change	4.76	0.05	**.57**	.11
8. A self-regulatory carbon usage scheme managed by business groups	2.78	0.10	.29	-.01
9. Improvements in public transport	4.85	0.04	.23	**.62**
10. Investment in fuel efficient vehicles	4.64	0.06	.31	**.55**
Cronbach's Alpha – Full-scale	.68			
Cronbach's Alpha – Sub-scale			.73	.65
% of variance explained – each factor			31.43%	15.20%
% of variance explained – all factors	46.63%			
Kaiser-Meyer-Olkin (KMO)	.70			
Bartlett's Test of Sphericity	$p < .001 (df = 45)$			

5.4.3 Regression results

Sub-scales were gained from the above exploratory factor analyses (EFA). Single scores for each of these sub-scales were then aggregated from their items. This section draws on the EFA results and investigates the direct impacts of the determinants in question on climate scientists' support for mitigation policies. Thereafter, the hypotheses of mediating and moderating effects are tested.

5.4.3.1 Effects of perceived adverse impacts of climate change (PI) and anthropogenic causes of climate change (PA) on support for behavioural policies (PS-BEH)

This study firstly examined the effects of perceived adverse impacts of climate change (PI), and perceived anthropogenic causes of climate change (PA) on climate scientists' support for behavioural mitigation policies (PS-BEH) (Model 1, Table 12). Among the four included variables, only adverse impacts of climate change on human wellbeing was found to be statistically significant in explaining support behaviour towards behavioural policies (standardised coefficient = .54, $p < .001$, Adjusted R-square = 18%). This suggests that when examining adverse impacts of climate change and its anthropogenic causes alone, the more that climate scientists perceive that climate change is likely to have impacts on human wellbeing, such as through food production or health, the more they tend to support behavioural policies.

However, when including variables that measure perceptions of policy effectiveness and feasibility into the model, adverse impacts of climate change in the form of destructive weather incidences, wellbeing-related impacts, and anthropogenic causes

of climate change significantly explain scientists' support for behavioural policies (Model 2, Table 12). Specifically, the more the scientists believe in adverse impacts of climate change on human wellbeing and the more they perceive that humans are responsible for causing climate change, the more they support these policies. However, the belief in the effects of climate change in the form of destructive weather incidences is negatively correlated with level of support for behavioural policies (standardised coefficient = -.24, $p < .05$).

Noticeably, the perceptions of policy effectiveness are dominant (compared to PI and PA variables) in explaining support for behavioural policies. The more scientists believe in the effectiveness of behavioural policies, the more they are likely to support the policies (standardised coefficient = .63, $p < .001$). On the contrary, scientists are less likely to support behavioural policies if they believe in the effectiveness of structural initiatives (standardised coefficient = -.25, $p < .05$). Among the two facets of perceived policy feasibility, only behavioural policies' feasibility is statistically significant (standardised coefficient = .19, $p < .05$) whilst structural policies' feasibility is not. The inclusion of policy-related attitudes such as policy effectiveness and feasibility helps increase the explained sample variation to 35%. Demographics such as gender, age, working location (state), and field of expertise do not have statistically significant impacts on the scientists' support for behavioural policies (*F-change* = .40, $p = .81$).

Table 12: Main effect results – Dependent variable: Support for Behavioural policies (The climate scientist sample)

	Dependent variable: Support for Behavioural policies (PS-BEH)		
	Model 1	Model 2	Model 3
	Beta[a, b] (S.E.)	Beta[a, b] (S.E.)	Beta[a, b] (S.E.)
(Constant)			
Perceived adverse impacts of climate change – *Wellbeing* **(PI-WEB)**	.54*** (.08)	.41*** (.07)	.42*** (.08)
Perceived adverse impacts of climate change – *Weather* **(PI-WEA)**	-.14 (.07)	-.24* (.06)	-.25* (.07)
Perceived adverse impacts of climate change – *Sea-level rises* **(PI-SEA)**	-.14 (.05)	-.10 (.04)	-.11 (.05)
Perceived anthropogenic causes of climate change **(PA)**	.13 (.06)	.17* (.06)	.18* (.06)
Perceived Effectiveness – *Behavioural policies* **(PE-BEH)**		.63*** (.07)	.60*** (.07)
Perceived Feasibility – *Behavioural policies* **(PF-BEH)**		.19* (.07)	.18* (.07)
Perceived Effectiveness – *Structural policies* **(PE-STR)**		-.25* (.08)	-.22 (.08)
Perceived Feasibility – *Structural policies* **(PF-STR)**		-.15 (.06)	-.14 (.06)
Demographics			
Gender (female=1)			-.05 (.09)
Age			-.04 (.04)
State			.06 (.02)
Field of expertise			-.03 (.05)
F (df)	8.40*** (139)	10.31** (139)	6.88*** (139)
R-square	.20	.39	.39
Adjusted R-square	.18	.35	.34
Change statistics			
R-square change	.20	.19	.01
F change *(df1, df2)*	8.40*** (4, 135)	9.99*** (4, 131)	0.40 (4, 127)

[a] Standardised coefficients
[b] *$p < .05$, **$p < .01$, ***$p < .001$, all are two-tailed tests, n = 140
S.E. = Standard Error

5.4.3.2 Effects of perceived adverse impacts of climate change (PI) and anthropogenic causes of climate change (PA) on support for structural policies (PS-STR)

The variables that measure perceived adverse impacts of climate change, and the anthropogenic causes of it, are statistically significant in explaining the scientists' support for structural policies (Model 4, Table 13). The more scientists perceive that climate change is likely to impact human's wellbeing, to increase sea levels, and that human beings are responsible, the more they support structural policies (respectively, standardised coefficients = .32, p <.01; .18, p < .05; .2, p < .05). On the contrary, climate scientists are less likely to support structural policies once they believe that climate change induces destructive weather incidences (standardised coefficient = -.27, p < .05).

As with the case of behavioural policies, once introducing policy-related attitude variables such as perceived policy effectiveness and feasibility, the influences of PI and PA variables on policy support are changed (Model 5, Table 13). Only wellbeing and weather incidence induced climate change impacts are statistically significant (respectively, standardised coefficients = .25, p <.05; -.31, p < .01). The inclusion of policy effectiveness and feasibility helps increase the explained sample variation from 10% to 35%.

Table 13: Main effect results – Dependent variable: Support for Structural policies (The climate scientist sample)

	Dependent variable: Support for Structural policies (PS-STR)		
	Model 4 Beta[a, b] (S.E.)	Model 5 Beta[a, b] (S.E.)	Model 6 Beta[a, b] (S.E.)
(Constant)			
Perceived adverse impacts of climate change – *Wellbeing* **(PI-WEB)**	.32** (.07)	.25* (.07)	.29* (.07)
Perceived adverse impacts of climate change – *Weather* **(PI-WEA)**	-.27* (.07)	-.31** (.06)	-.34** (.06)
Perceived adverse impacts of climate change – *Sea-level* **(PI-SEA)**	.18* (.04)	.07 (.04)	.06 (.04)
Perceived anthropogenic causes of climate change **(PA)**	.21* (.06)	.06 (.05)	.03 (.06)
Perceived Effectiveness – *Behavioural policies* **(PE-BEH)**		-.25* (.07)	-.26* (.07)
Perceived Feasibility – *Behavioural policies* **(PF-BEH)**		.01 (.06)	-.01 (.06)
Perceived Effectiveness – *Structural policies* **(PE-STR)**		.71*** (.07)	.75*** (.07)
Perceived Feasibility – *Structural policies* **(PF-STR)**		.00 (.06)	.01 (.06)
Demographics			
Gender (female=1)			-.11 (.08)
Age			-.01 (.04)
State			.01 (.02)
Field of expertise			.13 (.04)
F (df)	5.06*** (139)	9.65*** (139)	6.85*** (139)
R-square	.13	.37	.39
Adjusted R-square	.10	.33	.34
Change statistics			
R-square change	.13	.24	.02
F change *(df1, df2)*	5.06*** (4, 135)	12.51*** (4, 131)	1.16 (4, 127)

[a] Standardised coefficients
[b] *p < .05, **p < .01, ***p < .001, all are two-tailed tests, n = 140
S.E. = Standard Error

The influences of policy-related attitude variables on the level of policy support found in the case of behavioural policies were mostly repeated when the study examined structural ones. The variable of perceived policy effectiveness has the greatest impact on the scientists' support for structural policies. The more they believe in the effectiveness of structural policies, the more they are likely to support the policies (standardised coefficient = .71, $p < .001$).

The belief in the effectiveness of behavioural policies is negatively correlated with the level of support for structural policies (standardised coefficient = -.25 $p < .05$). Nevertheless, policy feasibility does not impact policy support in the case of structural policies, although it does in the case of behavioural policies. Regarding demographics, this study could not conclude any influence on the climate scientists' support for structural policies (*F-change* = 1.16, $p = .33$).

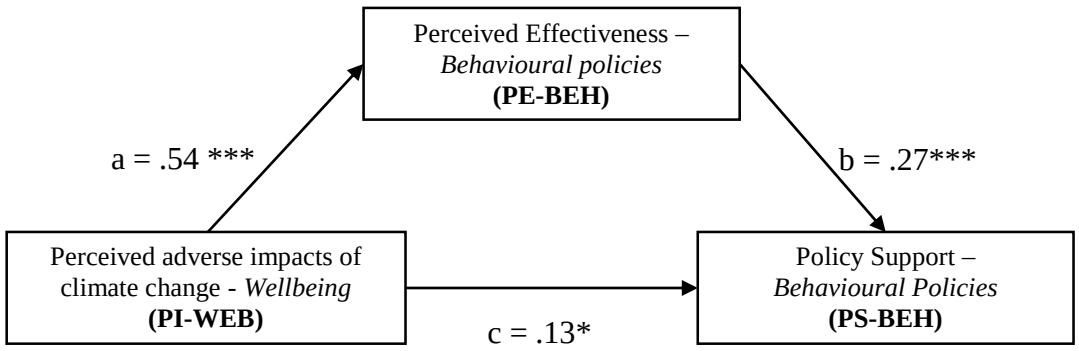
5.4.3.3 Mediating effect results

This study examined the mediating effects of perceived policy effectiveness (PE) on the links between adverse impacts of climate change on human wellbeing (PI-WEB) and policy support for two reasons. First, the Extended Parallel Process Model (EPPM) (Witte 1992) and the Risk Attitude Perception (RAP) framework lend support to this approach (please see more detail in Chapter Two – the analytical framework). Second, among the examined variables, only the PE and PI-WEB positively and consistently drive support for both behavioural and structural policies, as also found in the earlier investigations. Therefore, this study more closely investigated these mediating effects through the following two case studies.

Case One: Behavioural policy effectiveness (PE-BEH) mediates the link between perceived adverse impacts of climate change on human wellbeing (PI-WEB) and behavioural policy support (PS-BEH).

The results show that behavioural policy effectiveness partially mediates the link between perceived adverse impacts of climate change on human wellbeing and support for those policies (Figure 14).

Figure 14: Mediating effect of behavioural policy effectiveness on the link between perceived adverse impacts of climate change on human wellbeing and policy support.



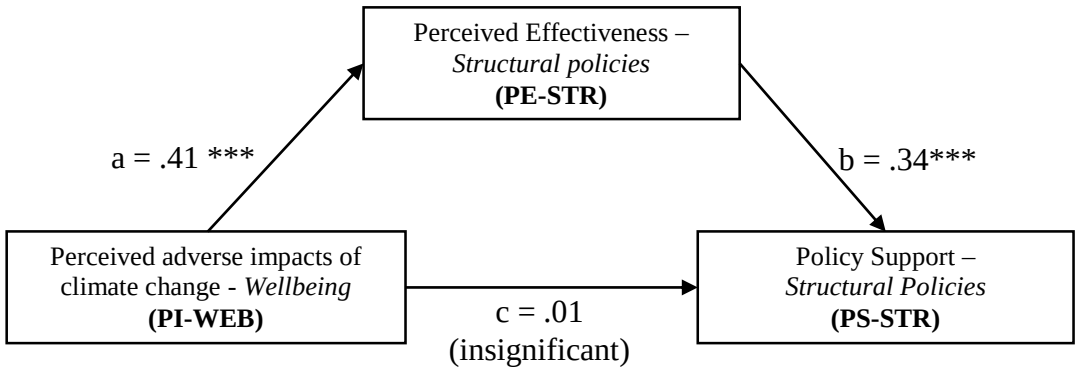
All displayed coefficients are unstandardised; *p <. 05; **p <. 01; ***p <. 001

PI-WEB significantly explains PE-BEH (a = .54***, *R*-square = .25, *F* (1, 138) = 45.48, p <. 001). PI-WEB is also statistically significant in explaining the scientists support for behavioural policies when controlling for those policies' effectiveness (b = .27***, c = direct effect = .13*, *R*-square = .30, *F* (2, 137) = 29.06, p <. 001). The bias-corrected bootstrap confidence interval yields a statistically significant indirect effect of PI-WEB on PS-BEH (indirect effect = .15, *SE* = .06, *Lower level confidence interval* = .09, *Upper level confidence interval* = .22).

Case Two: Structural policy effectiveness (PE-STR) mediates the link between perceived adverse impacts of climate change on human wellbeing (PI-WEB) and structural policy support (PS-STR).

Whilst this study detects a partial mediating role of policy effectiveness in the case of behavioural policies, examining the structural policies reveals that their effectiveness fully mediates the link between perceived adverse impacts of climate change on human wellbeing and support for those policies. This is concluded because paths *a* and *b* are statistically significant whereas the path c is not (Figure 15).

Figure 15: Mediating effect of structural policy effectiveness on the link between perceived adverse impacts of climate change on human wellbeing and policy support.



All displayed coefficients are unstandardised; *p <. 05; **p <. 01; ***p <. 001

PI-WEB significantly explains PE-STR (a = .41***, *R*-square = .16, F (1, 138) = 27.02, p <. 001). However, it is not statistically significant when PI-WEB and PE-STR were included to explain PS-STR (b = .34***, c = direct effect = .01, *R*-square = .30, F (2, 137) = 28.77, p <. 001). The indirect effect of PI-WEB to PS-STR is statistically significant as determined by the bias-corrected bootstrap confidence

(indirect effect = .14, *SE*=.04, *Lower level confidence interval* = .08, *Upper level confidence interval* = .23).

5.4.3.4 Moderating effect results

For the same reasons for examining the mediating effects described above, this study also investigated the following two cases of moderating effects.

> *Case Three: Perceived adverse impacts of climate change on human wellbeing (PI-WEB) moderates the link between behavioural policy effectiveness (PE-BEH) and behavioural policy support (PS-BEH).*

The results reveal that PI-WEB moderates the relationship between perceived behavioural policy effectiveness and support for the policies ($\Delta R\text{-}square$ = .05, ΔF (1,126) = 10.14, $p < .001$) (Model 7, Table 14). The interaction term of PI-WEB and PE-BEH is statistically significant in explaining the support for behavioural policies (unstandardised coefficient = -.18, $p < .001$). To understand in more detail the confirmed moderating effect, this study further examined simple slopes of the PE-BEH – PS-BEH relationship.

The slope coefficient of the PE-BEH – PS-BEH linear relationship at the low PI-WEB group (10^{th} percentile value) is .57 (*SE* = .09, $p < .001$), and at the moderate PI-WEB group (50^{th} percentile value) is reduced to .38 (*SE* = .07, $p < .001$). However, the slope coefficient is not statistically significant at the high PI-WEB group (90^{th} percentile value) (*SE*= .10, $p = .097$), although the slope coefficient at the 75^{th} percentile value of PI-WEB is significant (coefficient = .28, *SE*= .08, $p < .001$). This indicates that the perceived adverse impacts of climate change on human wellbeing negatively moderates the link between perceived effectiveness of

behavioural policies and support for those policies. However, this claim does not hold at the high PI-WEB group (90th percentile value).

Case Four: Perceived adverse impacts of climate change on human wellbeing (PI-WEB) moderates the link between structural policy effectiveness (PE-STR) and structural policy support (PS-STR).

This study also found a statistically significant moderating effect of PI-WEB on the link between policy effectiveness and policy support when examining structural policies ($\Delta R\text{-}square$ = .03, ΔF (1,126) = 6.98, p < .001) (Model 8, Table 14). The interaction term of PI-WEB and PE-STR is statistically significant in explaining structural policy support (unstandardised coefficient = -.15, p < .001). Examining simple slopes suggests that perceived adverse impacts of climate change on human wellbeing also negatively moderates the link between structural policy effectiveness and support for those policies. This claim holds for all the examined points of PE-WEB (10th, 50th, 90th percentile values). The slope coefficient of the relationship is .61 at the low PI-WEB group (10th percentile value) (SE = .09, p < .001). It is reduced to .44 (SE = .07, p < .001) at the moderate PI-WEB group (50th percentile value). The slope coefficient further declines to .27 (SE = .10, p < .001) at the high group of PE-WEB (90th percentile value).

Table 14: Moderating effect results (The climate scientist sample)

	Dependent variable: Support for Behavioural policies	**Dependent variable: Support for Structural policies**
	Model 7	Model 8
	Beta[a, b] (S.E.)	Beta[a, b] (S.E.)
(Constant)		
Perceived adverse impacts of climate change – *Wellbeing* **(PI-WEB)**	.29*** (.08)	.18* (.07)
Perceived adverse impacts of climate change – *Weather* **(PI-WEA)**	-.16* (.06)	-.20** (.06)
Perceived adverse impacts of climate change – *Sea level* **(PI-SEA)**	-.03 (.04)	.05 (.04)
Perceived anthropogenic causes of climate change **(PA)**	.14* (.06)	.03 (.06)
Perceived Effectiveness – *Behavioural policies* **(PE-BEH)**	.37*** (.07)	-.11 (.07)
Perceived Feasibility – *Behavioural policies* **(PF-BEH)**	.16* (.06)	.00 (.06)
Perceived Effectiveness – *Structural policies* **(PE-STR)**	-.12 (.08)	.44*** (.07)
Perceived Feasibility – *Structural policies* **(PF-STR)**	-.11 (.06)	.01 (.06)
PI-WEB x PE-BEH	-.18*** (.06)	
PI-WEB x PE-STR		-.15** (.06)
Demographics		
Gender (female=1)	-.05 (.09)	-.10 (.08)
Age	.00 (.04)	.00 (.04)
State	.01 (.02)	-.01 (.02)
Field of expertise	-.02 (.05)	.07 (.04)
F (df1, df2)	7.59*** (13, 126)	7.16*** (13, 126)
R-square	.44	.42
Adjusted R-square		
Change statistics [c]		
R-square change	.05	.03
F change *(df1, df2)*	10.14*** (1, 126)	6.98** (1, 126)

[a] Unstandardised coefficients, independent and moderating variables were mean-centred, n = 140
[b] *$p < .05$, **$p < .01$, ***$p < .001$, all are two-tailed tests
[c] Compared to the model without the interaction term; S.E.= Standard Error

5.5 Discussion

The descriptive analyses revealed differences between the general public and climate scientists in their attitudes towards adverse impacts of climate change, evaluations of mitigation policies, and policy preferences. The following section will provide insights into these differences and discuss their relevance to the literature.

5.5.1 Contrasting the general public and climate scientists

5.5.1.1 The differences in the perceived adverse impacts of climate change

A noticeable pattern was found when comparing lay people and climate scientists' perceptions of adverse impacts of climate change, in that the former tended to more concerned about most impacts than the latter. The only exception was that climate scientists expressed more concern regarding sea-level rises compared to the general public. Moreover, a more profound difference in attitudes towards adverse impacts was found between lay people and climate experts when contrasting the PI constructs' EFA structures.

Factor analyses from the sample of the Australian general public found a structure of two factors of PI, which are labelled as high-critical and low-critical impacts. The difference between the two factors is that the high-critical impacts touch on more critical and explicit damage from climate change on human wellbeing, such as on food and water availabilities, health and personal income. Whereas the low-critical impacts include effects that may be indirect and/or only recognised in the long-run, such as impacts on biodiversity. On the other hand, a similar procedure using the sample of climate scientists yielded a three-factor result. Climate scientists classified

the impacts into three facets: effects on human wellbeing; extreme weather; and sea-level rises.

These differences imply that lay individuals are concerned as to whether or not climate change will impact their basic livelihood, and therefore perceived the impacts as either high or low critical ones. This "personal concern" emotional aspect is probably embedded into the public's perception of adverse impacts of climate change (Linden & Sander 2014). Conversely, climate scientists' categorisation of the impacts may be emotion-free. This chapter found that the climate scientists' classification of the adverse impacts of climate change endorses findings of scientific reports such as from the CSIRO (Hennessy 2011). This report structured the adverse impacts into climate extremes and health, whilst sea-level rise is predicted to have significant impacts on almost every important facet of Australia's development, including the economy, infrastructure and biodiversity (Department of the Environment and Heritage 2003; Hennessy 2011).

5.5.1.2 The differences in mitigation policy evaluations and preferences

Regarding evaluations of mitigation initiatives, the most noticeable difference between the general public and climate scientists is related to carbon-related structural policies such as the carbon tax. There are significant gaps in perceptions of the carbon tax's effectiveness and feasibility between these two groups. Lay people consider the carbon tax least effective in mitigating climate change, whilst the scientists rank its effectiveness as second, just after the renewable energy initiative. The general public believe the carbon tax is the most feasible policy with regard to implementation, however, the scientists consider it the third least feasible mitigation

action. These divergences are associated with the differences found in the two samples' support level towards the carbon tax.

These differences probably reflect the imperfect flow of climate change information from the "knowledge pool" of climate scientists, to the end-users of the information, lay people (Weingart, Engels & Pansegrau 2000). Scientists believe carbon taxes are among the most effective market-based tools to reduce carbon emissions (Elkins & Baker 2001). The economic foundation is that pricing carbon emissions, such as through the implementation of a carbon tax, will encourage polluters to reduce their carbon footprint because their efforts in curbing emissions are rewarded financially.

However, the ways the Australian Federal Government designed and implemented the carbon tax, Emissions Trading Scheme, and earlier the Carbon Pollution Reduction Scheme departed from scientists' recommendations, including those of Garnaut (2008) and Stern (2006). Instead of directing the economy to reduce the overall carbon footprint, the government's generous subsidies for industries, freely allocated carbon emission permits, and fixed carbon price gave incentives for big polluters not to cut carbon emissions while transferring the carbon-tax-induced costs to consumers (Spash & Lo 2012). The Clean Energy Program used government funds to support industry in closing high carbon emitting plants instead of encouraging investments in renewable energy (Lo & Spash 2012). These observations suggest that recommendations regarding carbon pricing from scientists were only partially applied (Burgmann & Baer 2012), and that consequently Australia was implementing a watered-down carbon pricing tool. The media helped spread this picture (Hannam 2014) and partially contributes to a public perception of low effectiveness of the carbon tax in reducing carbon emissions.

Moreover, the differences between climate scientists and the general publics' perceptions of the feasibility of the carbon tax are probably related to the different aspects of the policy they focus on. The general public may gauge the policy's feasibility in administrations term. In fact, administering a carbon tax is easy and not costly (Elkins & Baker 2001). However, the experts may consider other aspects. They may believe that social reaction to the carbon tax is a significant barrier to the carbon tax implementation, especially when the general public only focus on their personal interests rather than climate change mitigations. This perspective is supported by the Social Dilemma literature, which predicts that individuals who consider their personal interests most will not sacrifice (e.g., pay higher electric bills) to protect the common goods (e.g., to reduce carbon emissions) (Wiener & Doescher 1991).

5.5.2 The influences of perceived adverse impacts and anthropogenic causes of climate change on policy support from the perspective of climate scientists

Influences of the perceived adverse impacts of climate change on policy support vary along the two domains of climate change mitigation policies. Climate scientists perceive adverse impacts of climate change in three facets: on human wellbeing such as food and water availability, income and health; through destructive weather incidences; and sea-level rises. Among the three domains, only the factor of adverse impacts on human wellbeing consistently relates to scientists' support for both behavioural and structural policies. The influences of the other two factors of climate change adverse impacts only become statistically significant when examining structural policy support. The fundamental difference between the two domains of

policies as suggested by the Social Dilemma literature, that is, mandatory (structural policies) versus voluntary (behavioural policies), could clarify the variation in the effects of the perceived adverse impacts of climate change on mitigation policy support.

According to the Social Dilemma literature, behavioural policies do not require individuals to sacrifice their personal interest to resolve the social dilemma of climate change mitigation. On the contrary, structural policies are usually mandatory which require all society members to sacrifice (such as the carbon tax does) to mitigate climate change (Wiener & Doescher 1991). Therefore, behavioural policies could be more easily accepted by society than structural ones, once individuals consider a cost-benefit analysis. Individuals may also not support structural policies should they perceive that their personal interests will not be directly affected if the social dilemma fails to be resolved. However, one disadvantage of behavioural policies compared to structural ones is that they are less likely to ensure the social dilemma will be resolved. Individuals may or may not take voluntary actions even if behavioural policies are in place. One of the barriers causing this reluctance is 'mistrust' (Wiener & Doescher 1991, p. 42). That is, individuals who voluntarily sacrifice to mitigate climate change might not believe that other society members will also cooperate. Thus, structural policies are needed if all of a society members' participation is required to resolve a social dilemma, and when not all society members are affected if the dilemma fails to be resolved.

The adverse impacts of climate change will continue if we fail to resolve the social dilemma of climate change. Different attitudes towards these adverse impacts could determine the preference for behavioural or structural policies to resolve the social

dilemma. Climate scientists believe that direct influences of climate change, such as on human wellbeing, are enough to trigger both behavioural and structural policy support. Individuals would act promptly to adverse impacts of climate change on their livelihood. However, as discussed earlier, to mitigate impacts which are longer term, and that have less direct impacts on individuals, structural policies are needed. Sea-level rises, for instance, is an impact which would be less likely to directly affect all individuals, but mostly those living in low areas. Consequently, for people who are not residents of coastal areas, sea-level rises resulting from climate change may not harm their livelihood. Therefore, these individuals are less likely to sacrifice, that is support structural policies, to mitigate this adverse impact of climate change. However, from the perspective of climate scientists, sea-level rises are among the most serious adverse impacts of climate change, and will affect many important facets such as biodiversity, the economy and infrastructure (Department of the Environment and Heritage 2003; Kevin 2011; Parry 2007; Preston & Jones 2006).

The potential for the general public to privilege personal benefits may explain why the sample of climate scientists did not indicate that behavioural policies would be successful in mitigating sea-level rise as an impact of climate change. Instead, the data indicates that they believe only structural policies will be successful in ensuring all society members make sufficient sacrifices. This could explain why the results reveal that climate scientists consider sea level rise as a trigger for structural policy support. Only mandatory actions such as structural policies can resolve perceived prolonged and indirect adverse impacts, such as sea-level rises.

Interestingly, the sample of climate scientists considered extreme weather to be a discouraging factor in their support for structural policies. Perhaps they are still

unsure about the correlation between climate change and extreme weather events. Many climate scientists believe that further long-term observations are needed to examine this correlation (Yale School of Forestry & Environmental Studies 2011). Consequently, the scientists may not be confident enough to communicate destructive weather incidences as a means of stimulating public support for structural policies.

It is noticeable that the variable of perceived anthropogenic causes of climate change is also statistically significant in explaining the support for structural policies. This implies that the scientists consider moral responsibility a useful driver for encouraging individuals to sacrifice to mitigate climate change. This endorses earlier research which confirms that the belief in the anthropogenic causes of climate change positively drives individuals' engagement in climate change mitigation activities (Aitken, Chapman & McClure 2011; O'Connor, Bord & Fisher 1999; Sibley & Kurz 2013).

5.5.3 The influences of perceived policy effectiveness on policy support

The results show that the policy effectiveness variables are salient in explaining policy support. Noticeably, their influence on the dependent variables varies according to the policy domains. In the cases of both behavioural and structural policies, the regression coefficients of the policy effectiveness variables are larger compared to those of the other variables, such as perceived adverse impacts and anthropogenic causes. Once the scientists believe in the effectiveness of one domain of the policies, they are likely to support that policy domain and oppose the other.

The above results confirm that scientists recognise the importance of policy effectiveness in encouraging support for climate change mitigation policies. The data from the sample of climate scientists also suggests that over-stressing a particular domain of policies in terms of effectiveness may harm support for other types of policies. This finding is important for policymakers who are trying to stimulate public support for structural policies, which are less likely to gain public acceptance than behavioural policies. Moreover, this chapter's findings of mediating and moderating effects help further understand the mechanism through which policy effectiveness drives policy support, and the interaction effect between perceived adverse impacts of climate change and policy effectiveness.

Examining the mediating effects shows a complex dynamic through which policy effectiveness drives policy support. Policy effectiveness fully mediates the relationship between the adverse impacts of climate change and support for structural policies. This implies that from the perspective of the climate scientists, individuals will only translate the perception of adverse impacts of climate change into support for structural policies once they consider the policies' effectiveness. On the contrary, policy effectiveness only partially mediates the link between climate change impacts and support for behavioural policies. This implies that the adverse impacts of climate change have both direct and indirect influences on support for non-sacrifice-requiring policies. The climate scientists believe individuals will only sacrifice to ameliorate climate change risks (support structural policies) once they are persuaded that their sacrifice can resolve issues. The scientists also believe that individuals would take voluntary actions to mitigate adverse impacts of climate change (support behavioural policies) with or without considering these initiatives' effectiveness.

The moderating effect results suggest that excessive communication of the adverse impacts of climate change could harm the positive effect of policy effectiveness on policy support, although this factor can also be translated into policy support. Moreover, it is important to remember the confirmed dominance of policy effectiveness in explaining public support for climate change mitigation policies. Consequently, the climate scientists may believe that the inclusion of information about climate change impacts is necessary in early stages of climate change communication. It helps attract the public's attention to the need for climate change mitigation. However, the effectiveness of policy should be more empathised to stimulate support for climate change mitigation policies.

5.5.4 Suggestions for bridging the gaps in attitudes towards climate change and mitigation engagement between lay audiences and experts

If one pictures climate change communication as a stream of climate change knowledge, then climate scientists are upstream. They find evidence of human-induced climate change, predict possible adverse impacts of it on human wellbeing, and guide our mitigation efforts. Nevertheless, the flow of climate change information is nonlinear. Many other stakeholders are involved in climate change conversations, such as politicians and journalists, whose interpretations of knowledge may depart from its scientific meanings (Weingart, Engels & Pansegrau 2000). Consequently, the end-users of the information, lay people, who are downstream in the communication flow, are likely to receive distorted information. This imperfect communication has created divergences in climate change knowledge (e.g., causes of climate change) between lay people and scientists (Fransson & Gärling 1999; Kempton 1993; O'Connor et al. 2002; Viscusi & Zeckhauser 2006),

which is slowing down responsive actions (Sterman & Sweeney 2007). However, it is not only the "knowledge gaps" that have delayed our mitigation actions, but also attitudinal differences. This study contributes to the literature by offering empirical evidence for this assertion.

Although Australians consider climate scientists as the most trusted source of climate change information (Buys et al. 2012; Leviston & Walker 2011b), this study found that the two samples have different perceptions regarding climate change's adverse impacts and mitigation policies. These differences perhaps result from the way climate change information is produced (by the scientists) and consumed (by the general public).

It is assumed that scientists would most value and strive for scientific clarity (e.g., evidence-based and emotion-free) in any information they give and receive. On the other hand, the general public's ultimate interpretations of information are influenced by psychological factors, such as "personal concern" (Linden & Sander 2014). Taking the difference in the concern of sea-level rises as an example, this study found that the general public perceive the impact to be less of a concern than the climate scientists. However, lay people are more concerned about other impacts considered in this study, such as on health, food and water availability, and personal incomes. This is perhaps because not all of the lay participants could relate sea-level rises to their personal interests. What should climate scientists do to resolve the issue?

This study also found that educational initiatives are perceived by both the samples as effective in mitigating climate change. Education may be also helpful in calibrating attitudinal gaps, such as differences in the perceptions of adverse impacts

of climate change. For this reason, scientists are encouraged to translate scientific facts into 'concrete experiences' from which lay audiences can connect their personal concerns into the emotionless facts (Shome, D. et al. 2009, p. 14). Scientists may want to further explain the extent to which the impact of sea-level rises will affect a general audience's personal interests, rather than only those who are residents of coastal areas. However, whilst the "knowledge gaps" or this study's "attitudinal gaps" may be recalibrated by reframing scientific facts (Shome, D. et al. 2009), blurring the differences in attitudes towards mitigation policies between the two samples requires more than the efforts of scientists, but also input from other important communicators such as politicians and the media (Weingart, Engels & Pansegrau 2000).

Considering climate scientists as "bias-free" individuals (whose ultimate desires are not to preserve personal interests but mitigate climate change), this investigation into factors driving their support for mitigation policies provides suggestions for improving the effectiveness of climate change mitigation communication. It is concluded that policy effectiveness is a salient factor in driving support for climate change mitigation policies, although the perceived adverse impacts of climate change is also important from the perspectives of climate scientists. Perceived policy effectiveness is the "gatekeeper" for the influence of perceived adverse impacts on policy support, especially on sacrifice-requiring mitigation initiatives. This implies, according to the scientists, that to encourage the public's engagement with policies such as the carbon tax or Emissions Trading Scheme, policymakers should communicate the adverse impacts of climate change to raise the public's awareness of the issue. On the other hand, the extent to which policies help to effectively reduce carbon emissions should also be conveyed. Otherwise, the heightened awareness

would be less likely to be translated into public support for the policies. Moreover, this study found interaction effects between policy effectiveness and perceived adverse impacts, in which the latter curbs the stimulating effect of the former on policy support. This again cautions against the overuse of the "fear appeal" communication approach (Linden & Sander 2014; Shome, D. et al. 2009; Witte 1992).

CHAPTER SIX

CONCLUSION

6.1 Overview

The global scientific community agrees that climate change is a reality. It is also generally agreed that human activities contribute to this climate change (Ramaswamy et al. 2006; Santer et al. 2003; Santer, Taylor & Penner 1995), and that the cost of ignoring this risk is higher than the cost of mitigating it (Garnaut 2008; Preston & Jones 2006). Therefore, we may not have the luxury of further delaying taking action against climate change. Unfortunately, Australia, and many other nations, are still struggling to garner public support for mitigation policies which is essential for any climate action to be successful. What drives public support for mitigation initiatives? This has been an important, challenging, yet inadequately studied question in the literature. The current thesis aims to contribute to this body of knowledge.

The literature has shown that beliefs in anthropogenic causes of climate change, and in its adverse impacts, are among important factors driving public support for mitigation policies. However, these two factors alone seem to be insufficient to encourage public support for tough and effective mitigation policies. The carbon tax in Australia illustrates this argument. A majority of the Australian public are climate change believers who demonstrate a high awareness of the anthropogenic causes of climate change, and perceive the risks from climate change (Australian Research

Group 2007; Burgmann & Baer 2012; Climate Institute 2014; Connor & Stefanova 2012; Stefanova 2013). However, only 36% of Australians indicated that they were willing to support the carbon tax (Hanson 2012), partially leading to the withdrawal of this initiative. It has been argued that one of the reasons for this inadequate public support may have been the perception of limited effectiveness of the carbon tax in curbing carbon emissions (Hannam 2014; Lo & Spash 2012; Spash & Lo 2012). However, the literature has largely ignored the role of this determinant of public support for mitigation policies in academic discussions.

This thesis therefore incorporated the role of perceived policy effectiveness in existing models of policy support behaviour based solely on the influence of perceived adverse impacts of climate change. It also considered other determinants such as perceived anthropogenic causes of climate change, and perceived feasibility of climate change mitigation policies. The aim of the thesis was to investigate public support for mitigation policies, especially in cases where the general public seems to have a high awareness of climate change issues, yet public support for tough mitigation policies is limited.

Chapter Two built an analytical framework which provided the theoretical rationale for the direct influences of the determinants in question on public support for mitigation policies. The analytical framework also argued for four drivers of public support for mitigation policies, perceived adverse impacts of climate change, perceived anthropogenic causes of climate change, perceived effectiveness of mitigation policies, and perceived feasibility of the policies, proposing mediating and moderating mechanisms. Chapter Three and Chapter Four of the thesis tested the analytical framework with a survey sample of Australian climate change believers.

The data supported most of the analytical framework's hypothesises, but the influences of perceived policy feasibility on individuals' support for mitigation policies seemed weak and inconsistent. Notably, the chapters highlighted the role of perceived policy effectiveness, which is more significant than previously thought. Taking into account factorial structures of the constructs in question, Chapter Three and Chapter Four reveal a complex dynamic through which the determinants in question drive public support for mitigation policies. This study also found evidence for the hypothesised mediating and moderating effects. This helps provide important suggestions for better utilising the determinants in question to stimulate public support for mitigation policies. The empirical findings also endorse and extend the Extended Parallel Process Model (EPPM) to be more applicable in the context of climate change communication. Chapters Two, Three, and Chapter Four examined the first three research questions of the thesis:

- **Research Question One:** *What drives public support for climate change mitigation policies?*
- **Research Question Two:** *Compared to perceived adverse impacts of climate change, what role does perceived policy effectiveness play in driving mitigation policy support behaviour?*
- **Research Question Three:** *To what extent do the determinants of the support behaviour influence each other when explaining the identified behaviour?*

The thesis also sought to take into account possible attitudinal differences between two important stakeholders in climate change communications, the general public

and climate scientists, with the view to determining obstructions in climate change communications regarding the adverse impacts of climate change and mitigation policies. Chapter Five contrasted data from the Australian general public sample with that from a sample of climate scientists to examine these attitudinal gaps. The identified gaps help partially explain the reluctance of Australian climate change believers to support mitigation policies. Chapter Five also tested the analytical framework from Chapter Two through the climate scientist sample, highlighting ways to improve climate change communication, and to better encourage individuals to support mitigation policies. The findings from Chapter Five provide answers to the fourth and fifth research questions.

- **Research Question Four:** *What are the differences between the general public and climate scientists in attitudes towards climate change, evaluation of climate change mitigation policies, and support for them?*

- **Research Question Five:** *What drives climate scientists' support for climate change mitigation policies?*

Table 15 summarises the individual chapter's conclusions according to the research questions. The remainder of this concluding chapter further elaborates on the findings and contributions of the thesis, and highlights suggestions for future research.

Table 15. A summary of the thesis's conclusions

RESEARCH QUESTIONS AND CONTRIBUTING CHAPTERS	CONCLUSIONS
• **Research Question One:** *What drives public support for climate change mitigation policies?*	- Perceived adverse impacts of climate change (PI) and perceived anthropogenic causes of climate change (PA) are among common and well-evidenced determinants of public support for mitigation policies (PS).
• **Contributing chapter: Chapter Two**	- Perceived policy effectiveness (PE) and feasibility (PF) are important but not adequately examined drivers of public support for mitigation policies. The roles of these two determinants are supported by the Theory of Planned Behaviour (Ajzen 1991) and the Social Dilemma literature (e.g., Wiener & Doescher 1991). - The thesis focuses on four determinants to explain PS: PI, PA, PE, and PF. - PI moderates the link between PE, PF and PS. It is also proposed that PE and PF are mediators of

RESEARCH QUESTIONS AND CONTRIBUTING CHAPTERS	CONCLUSIONS
	the link between PI and PS. These hypotheses are built upon the Extended Parallel Process Model (Witte 1994), and the Risk Perception Attitude framework (Rimal & Juon 2010). - Individuals' support for mitigation policies also depends on the basic characteristics of mitigation initiatives, e.g., voluntary (behavioural) or mandatory (structural) aspects. The influences of the determinants of PS were examined across these two aspects of mitigation policies. - An analytical framework was developed to explain public support for climate change mitigation policies.
• **Research Question Two:** *Compared to perceived adverse impacts of climate change, what role does perceived policy*	- The analytical framework developed in Chapter Two was tested through a sample of 1,476 Australian adults. - The data suggest that PI, PA, and PE positively drive PS. However, the effect of PF on PS seems

RESEARCH QUESTIONS AND CONTRIBUTING CHAPTERS	CONCLUSIONS
effectiveness play in driving mitigation policy support behaviour? • **Contributing chapter: Chapter Three**	to be weak and inconsistent. - PE was found to be dominant over other determinants including PI. PE showed the largest regression coefficients in models predicting the four determinants' influences on PS. This suggests that PE is among key drivers of public support for mitigation policies. - Participants' support for mitigation policies varies according to the aspect from which the individuals perceived the adverse impacts of climate change (high-critical versus low-critical adverse impacts). Further, the influences of the determinants in question on PS were different across the two domains of mitigation policies (structural or behavioural initiatives). Therefore, the factorial structure of PI, and basic characteristics of mitigation policies should be taken into account when one studies public support for the initiatives.

RESEARCH QUESTIONS AND CONTRIBUTING CHAPTERS	CONCLUSIONS
• **Research Question Three:** *To what extent do the determinants of the support behaviour influence each other when explaining the identified behaviour?* • **Contributing chapter: Chapter Four**	- Besides the independent effects of PI and PE on PS, the thesis concludes that the two determinants may influence each other when driving PS. - The impact of PF on PS is conditioned by PI. The PF – PS linkage may be weakened if PI gets stronger. In other words, the more participants believe in the adverse impacts of climate change, the weaker the PE – PS link would become. - PE is a mediator of the relationship between PI and PS. Thus, while PI is important in raising awareness of climate change issues, policy effectiveness is the key to individuals' support for mitigation policies, especially structural ones such as the carbon tax. - The Extended Parallel Process Model (EPPM), and the Risk Perception Attitude (RPA) framework were applicable in the context of climate change communication. This research expanded the EPPM and RPA by suggesting that the nature of risk ameliorating solutions should be indicated.

RESEARCH QUESTIONS AND CONTRIBUTING CHAPTERS	CONCLUSIONS
• **Research Question Four:** *What are the differences between the general public and climate scientists in attitudes towards climate change, evaluation of climate change mitigation policies, and support for them?* • **Contributing chapter: Chapter Five**	- Evidence of non-linearity in climate change communication was detected. There were significant gaps between the Australian general public and climate scientists in their perceptions of the adverse impacts of climate change, evaluations of mitigation policies, and level of support for initiatives. - Lay audiences' perception of the adverse impacts of climate change seem to be more influenced by "personal concern", whilst climate experts are likely to perceive impacts free of emotion and based on scientific evidence. This suggests why the general public are more concerned about livelihood-relevant adverse impacts such as health, food and water availability, whilst the scientists are more concerned by sea-level rises. - There are significant gaps in perceptions of the carbon tax's effectiveness and feasibility between these two groups. Lay people consider the carbon tax least effective, and most feasible of

RESEARCH QUESTIONS AND CONTRIBUTING CHAPTERS	CONCLUSIONS
	mitigation policies. On the contrary, scientists believe that tax as effective but not easily implemented. - These variations help explain the differences between the two groups' support of mitigation policies such as the carbon tax.
• **Research Question Five:** *What drives climate scientists' support for climate change mitigation policies?* • **Contributing chapter: Chapter Five**	- Testing Chapter Two's analytical framework with the climate scientists sample found that PI, PA, PE are significant drivers of their support for mitigation policies. However, compared to the conclusions gained from the general public sample, there are important differences in the influences of the determinants on the climate scientists' PS. - Climate scientists believe that direct influences of climate change, such as on human wellbeing, are enough to trigger both behavioural and structural policy support. However, to mitigate longer term impacts that have less direct effects on individuals, such as sea-level rises, structural policies

RESEARCH QUESTIONS AND CONTRIBUTING CHAPTERS	CONCLUSIONS
	are needed. - The scientists consider policy effectiveness as key to stimulating support for mitigation policies, and that the influences of policy effectiveness on the dependent variables vary with the policy domains. The moderating and mediating patterns found in the sample of lay people were also found when examining the scientist group.

6.2 Examined Drivers of Public Support for Climate Change Mitigation Policies and How They Work

This thesis examined four drivers of public support for mitigation policies: perceived adverse impacts of climate change, perceived policy effectiveness, perceived anthropogenic causes of climate change, and perceived policy feasibility. Amongst these results of the first two determinants provide the most notable conclusions.

The thesis found an important role for perceived adverse impacts of climate change (PI) in explaining public support for mitigation policies and extends our understanding of this determinant. Chapter Three found evidence of the simplification of the perceived adverse impacts by the general public, which contradicts previous suggested factorial-structures of the variable such as in the well-established Value – Belief – Norm (VBN) model (Stern et al. 1995). Exploratory analysis results revealed that the general public perceive adverse impacts in two categories high-critical and low-critical, with category attribution depending on the perceived likelihood that the impacts affect their wellbeing. On the other hand, the VBN model suggests that the PI construct may include three domains: altruistic (impacts on the others), egoistic (impacts on the individual), and biospheric (impacts on the non-human species). This thesis argues that perhaps because of the complexity of climate change and its impacts, lay individuals may classify these impacts into these two domains instead of the three suggested by the VBN model.

Secondly, the proposed bi-factorial structure of the PI construct also provides insight into the effects of this construct on mitigation policy preferences. The analysis of the

general public sample in Chapter Three suggests that impacts which are more likely to affect human wellbeing stimulate stronger support for sacrifice-requiring mitigation initiatives. This again highlights the role of personal interests in explaining support for structural policies, which is backed by the Social Dilemma literature. That is, individuals are willing to accept mandatory mitigation policies which require all of the community to sacrifice, in order to protect their personal interests. However individuals may want to ensure no "free-riders" can enjoy the benefits of climate change mitigation, while avoiding engaging in mitigation actions. This preference for structural policies might also reflect the general public's desire for society-scaled collective actions to ameliorate high-critical adverse impacts of climate change on their wellbeing.

Whilst the PI construct is well-documented in the literature, perceived policy effectiveness (PE) has not been adequately examined as a driver of public support for mitigation policies. This thesis draws some conclusions that help further understanding of the role of this construct. Among the determinants, perceived policy effectiveness was found to be the most salient factor in driving support behaviour, as concluded in Chapters Three and Four. The dominance of this construct is two-fold. First, the variable has robust regression coefficients compared to other determinants in question (Chapter Three's findings), and second, it mediates the link between perceived adverse impacts of climate change and structural policy support behaviour (Chapter Four's findings).

These findings are surprising because there has been a general agreement that perceived adverse impacts of climate change (PI) is the most influential driver of public support for mitigation policies, and therefore the use of this construct in

stimulating public support is common (Linden & Sander 2014). However, the thesis's findings suggest that an excessive focus on the risks of climate change in general, without also detailing risk ameliorating strategies, should be avoided (Shome, Debika et al. 2009).

Of course determinants of support behaviour towards mitigation policies are not limited to the behavioural determinants that this thesis employed, however, the findings imply that policy effectiveness plays a more important role than previously thought. Perceived policy effectiveness is salient in transforming the general public's high awareness of climate change issues into support for mitigation policies, including tough ones such as the carbon tax. The found mediating effect of policy effectiveness on the linkage between the general public's perceived adverse impacts of climate change, and their support for mitigation policy, implies that policy effectiveness may be the key to encouraging people to make climate change mitigation related sacrifices. Consequently, policymakers may want to focus on this important construct if they are seeking to inspire the public to support structural solutions such as the carbon tax. Given that Australian Governments' design and implementation process for the carbon tax, Emissions Trading Scheme, and the earlier Carbon Pollution Reduction Scheme, may have resulted in poor public perception of the policies' effectiveness (Hannam 2014; Lo & Spash 2012; Spash & Lo 2012), it is imperative that government agencies should seek to more clearly communicate policy effectiveness parameters. By designing public information campaigns that emphasise policy effectiveness, this research suggests governments could increase public support for, and engagement with, climate change mitigation policies.

The research findings also highlight negative implications of the over-use of fear-appeal approaches in climate change communication. This is demonstrated by the interaction effects between perceived adverse impacts of climate change and perceived policy effectiveness, especially when examining structural policies (Chapter Four's findings). In cases where the effect was empirically proven, it was found that perceived adverse impacts of climate change weakens the link between perceived policy effectiveness and policy support. This again encourages a re-focusing from adverse impacts of climate change to policy effectiveness in explaining public support for mitigation policies.

6.3 The Influences of Fundamental Characteristics of Climate Change Mitigation Policies on Policy Preferences

One important conclusion of this thesis is that the fundamental characteristics of climate change mitigation policies should be considered when explaining public support for the policies. Chapter Three's exploratory factor analyses suggest that the general public may classify policies into two domains when making policy evaluations and determining preferences: structural policies and behavioural policies. Structural policies, such as the carbon tax, are sacrifice-requiring and mandatory. Behavioural mitigation policies are often incentivised to encourage voluntary actions. Government subsidies for renewable energy alternatives are an example of behavioural initiatives.

The influences of the fundamental characteristics of mitigation policies imply that the general public considers their personal self-interests when deciding whether to

support policy initiatives. This is well supported by the Social Dilemma literature. According to this literature, taking into account the role of personal interest is important when encouraging individuals' cooperation in social dilemma cases such as climate change mitigation (Wiener & Doescher 1991). Mitigating climate change requires collective efforts from every member of the society, whilst climate change may adversely impact them unequally. People whose livelihoods depend heavily on coastal areas might be more severely affected by sea-level rises than others. Consequently, individuals who are less likely to be adversely affected by climate change may be less motivated to engage in mitigation actions (which may be costly) on the basis of a cost-benefit analysis. Moreover, individuals who are likely to be adversely impacted by climate change still may not want to engage in mitigation actions as they might perceive their sacrifices through supporting structural policies are insufficient to ameliorate the risks of climate change, if others do not cooperate at the same level (Wiener & Doescher 1991).

The Social Dilemma literature suggests ways to overcome these barriers depending on the characteristics of the cooperative solutions, which in this case are mitigation policies. For instance, to resolve the "sucker avoid" barrier the effectiveness of mitigation initiatives should be emphasised (Wiener & Doescher 1991). This thesis therefore urges for further applications of the Social Dilemma literature in studying public support for mitigation policies.

6.4 The Differences between Lay People and Climate Scientists

This thesis found several important differences when contrasting the two samples of lay individuals and climate scientists. Chapter Five demonstrated that the two samples have different perceptions of the adverse impacts of climate change, especially in the way they conceptualise the impacts. For instance, lay individuals perceive the adverse impact of sea-level rises as less severe than climate experts do. Lay individuals may not categorise this impact as one likely to affect their wellbeing, whilst scientists believe sea-level rises are likely to have substantial adverse impacts, including on health and economic development (Hennessy 2011).

The above mentioned differences between lay audience and scientist groups, through the direct linkage between perceived adverse impacts of climate change and mitigation policy support behaviour, may partially lead to divergences in mitigation policy preferences between the two groups. The general public may support structural policies (mandatory and sacrifice-requiring) as a means of addressing perceived high-critical adverse impacts of climate change (such as on food and water availability, health, and income). On the other hand, climate scientists may believe that these structural initiatives should be implemented to ameliorate more implicit and prolonged (from a lay perspective) adverse impacts such as sea-level rises.

Therefore, this thesis argues there is a need to reduce the gap between the perceptions of the general public and climate scientists regarding the adverse impacts of climate change. This recommendation is based on the assumption that climate scientists' ultimate purpose is to mitigate climate change, and as such their suggestions should be taken seriously. However, lay individuals may still prioritise their personal self-interests when considering which mitigation policies to support.

The challenge therefore is to clarify and connect implicit and prolonged adverse impacts of climate change, such as sea-level rises, to lay people's personal interest domain (Shome, Debika et al. 2009). By doing this, we might be able to better direct public support to effective mitigation strategies.

Chapter Five also found significant gaps between lay people and climate scientists in their perceptions of the effectiveness and feasibility of carbon-related mitigation initiatives such as the carbon tax. Direct links between perceived policy effectiveness, feasibility and policy support also seem to partially contribute to divergences in the two groups' mitigation policy preferences. For instance, the general public is less likely to support carbon-related mitigation initiatives than climate scientists. These misalignments may also result from the nonlinearity of climate change communication, in which media, politicians, and business sectors are likely to distort climate change scientific information when it is transferred from climate scientists to lay audiences (Weingart, Engels & Pansegrau 2000).

Addressing these varied policy evaluations and preferences requires the efforts of policymakers, rather than climate scientists. Scientists are still considered by lay people to be the most trusted source of climate change knowledge (Buys et al. 2012; Leviston & Walker 2011b). However, when it comes to mitigation policy implementation, lay individuals' perceptions might be also heavily influenced by policymakers. The general public might evaluate the potential effectiveness of mitigation initiatives according to the ways governments design and implement them, and therefore a government's climate change mitigation performance is likely to affect lay people's policy preferences (Lubell 2003). As outlined in the

introduction, the history of Australia's climatic movements lends support to this assertion (see Chapter One).

It is clear then that policymakers have an important role in stimulating the general public's support for mitigation initiatives, or dampening it. Australian Governments have to date mostly been unable to take the advantage of the general public's high awareness of climate change issues to further mitigation actions through policy (Burgmann & Baer 2012). However, it has been observed that there is likely to be another "green wave", as the proportion of Australians who want their nation take leadership in climate change action is again increasing (Jackson 2014; Koser 2014; Stefanova 2014). Should governments want to further increase public support for mitigation policies, then understanding the drivers of climate change mitigation support behaviour is essential. The following sections draw on these findings to highlight the contributions of this thesis.

6.5 Contributions

This thesis contributes both academic and practical knowledge to understanding support for climate change policy. It is among first pieces of research to examine the extent to which the fundamental characteristics of mitigation policies affects policy preferences. This research has demonstrated that important drivers of public support for the policies, such as perceived adverse impact of climate change and perceived policy effectiveness, should be utilised wisely depending on the policy domain.

Second, this thesis provides empirical evidence for warnings against "fear appeal" over-use in climate change communication (Linden & Sander 2014; Shome, D. et al.

2009). This contribution may be more critical, especially given the ways the media has reported on the subject of climate change. Hart and Feldman (2014) warned that the US television networks have conveyed the risks of climate change without also significantly addressing risk ameliorating solutions. Even when risk ameliorating solutions are discussed, it seems to be independently communicated to the risks. Also, these authors found that network television stories paid little attention to the concept of policy effectiveness. This thesis suggests that this approach to communication is not effective in encouraging public support for mitigation policies. Firstly, because it may lead to "emotional numbing", which reduces individuals' emotional reactions to the risks of climate change (Shome, D. et al. 2009). Second, a lack of communication of the effectiveness' in addressing climate change may discourage public support for the initiatives, as this thesis found.

In addition, this thesis is among early attempts to apply the Extended Parallel Process Model to a new field – climate change mitigation behaviour. Despite many calls for the application of the model to the field of climate change related policy research (e.g., Hart & Feldman 2014; Linden & Sander 2014), there have been, until now, limited or no research responses. Through this application of the EPPM model, this thesis has highlighted the role of an inadequately examined driver of mitigation policy support behaviour: policy effectiveness. Not only does this thesis prove the salience of the variable in stimulating public support for mitigation initiatives, it also examines and offers empirical evidence for a mechanism through which policy effectiveness drives policy support behaviour. In doing so, this thesis responds to research calls of Bostrom et al. (2012) and Wan et al. (2013).

Further, by exploring the role of perceived policy effectiveness this thesis contributes to broader research on pro-environmental behaviour (PEB). Besides the direct influence that perceived policy effectiveness has on PEB (Wan, Shen & Yu 2014b), and the moderating effects on the link between common attitudinal determinants such as subjective norms (Wan, Shen & Yu 2014a), this thesis demonstrates that PE has mediating effects on the relationship between perceived risks and PEB. This finding therefore suggests a need for further consideration of this important determinant of PEB.

Finally, the thesis contributes to the literature by looking beyond the common "knowledge gaps" between lay individuals and scientists, by contrasting the two samples for differences in attitudes towards climate change adverse impacts and mitigation policies. Identifying these important gaps offers meaningful suggestions for enhancing climate change communication which currently suffers from constrains that impede the role of scientific expertise in mitigation efforts (Sterman 2011). Taking sea-level rises for instance, it is perceived by lay people to implicitly affect human wellbeing; however, it is one of the adverse impacts that is of most concern to climate scientists. This thesis suggests then that policymakers and other stakeholders in climate change communication should direct their efforts into reducing the differences in the perceptions of adverse impacts, in particular those which are not seen by the general public to explicitly affect human wellbeing. Moreover, examining the drivers that affect policy support behaviour of the "bias-free" individuals, such as climate scientists, reveals many insights into a better model for directing public support towards effective climate change mitigation.

6.6 Future Research Directions

This thesis also suggests some future research opportunities. Among the determinants in question, perceived policy feasibility seems to have an inconsistent effect on policy support behaviour. It is postulated that the construct may be too complicated to be captured by a single questionnaire item. Individuals may perceive the feasibility of mitigation initiatives in many different ways, including technological, economic, and political ones. Further investigation into this construct is therefore required.

It is also suggested that the construct of perceived adverse impacts of climate change deserves further consideration. Future research may explore different aspects of this perceived risk construct, such as rational and emotional perceptions of risk (Slovic et al. 2004). If one conceptualises perceived risk as a domain of knowledge, then the mediating hypothesis examined in this study may be better examined through the Knowledge-Attitude-Behaviour framework of Kollmuss & Agyeman (2002).

Finally, it is acknowledged that there may be concerns with the internal validity of the constructs as they relate to structural policies (PE-STR, PF-STR, PS-STR) (Alphas < .7). Although the Alpha levels were valid for statistical analysis, further research could focus on improving the measure of these constructs in order to enhance their internal validity. It is moreover acknowledged that this thesis examined one-off survey datasets. This may have limited the examination of variation in the effect of policy effectiveness. Although the thesis's empirical studies controlled for some external variables such as political affiliations, changes in government or policy communication and implementation may potentially influence the perception

of policy effectiveness. Therefore, it is proposed that the future research consider a longitudinal research approach to be able to observe this possible variation.

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APPENDIXES

Appendix 1: Multi-colinearity test results (the General public sample)

	Dependent variable: Support for Behavioural policies			**Dependent variable: Support for Structural policies**		
	Beta[a]	t[b]	VIFs	Beta[a]	t[b]	VIFs
(Constant)		33.94***			11.51***	
Perceived adverse impacts of climate change – *Low critical* **(PI-LOCR)**	.15	3.71***	3.07	.05	1.63	3.07
Perceived adverse impacts of climate change – *High critical* **(PI-HICR)**	-.18	-4.82***	2.66	-.01	-.21	2.66
Perceived Anthropogenic cause of climate change **(PA)**	.08	2.86**	1.40	.12	6.00***	1.40
Perceived Effectiveness – *Behavioural policies* **(PE-BEH)**	.50	15.21***	2.10	-.14	-5.51***	2.10
Perceived Feasibility – *Behavioural policies* **(PF-BEH)**	-.01	-.43	1.32	.00	.04	1.32
Perceived Effectiveness – *Structural policies* **(PE-STR)**	-.05	1.60	2.22	.77	30.39***	2.22
Perceived Feasibility – *Structural policies* **(PF-STR)**	-.04	-1.56	1.32	-.04	-1.85	1.32

[a] Standardised coefficients

[b] *p < .05, **p < .01, ***p < .001, all are two-tailed tests

(VIFs below 5.0 indicate insignificant multi-colinearity issues (Hair 2010))

Appendix 2: Multi-colinearity test results (the Climate scientist sample)

	Dependent variable: Support for Behavioural policies			**Dependent variable: Support for Structural policies**		
	Beta[a]	t[b]	VIFs	Beta[a]	t[b]	VIFs
(Constant)		8.82***			10.28***	
Perceived Anthropogenic causes of climate change **(PA)**	.17	2.23*	1.23	.06	.76	1.23
Perceived of climate change – *Wellbeing* **(PI-WEB)**	.41	3.82***	2.44	.25	2.30*	2.44
Perceived adverse impacts of climate change – *Weather* **(PI-WEA)**	-.24	-2.23*	2.52	-.31	-2.82**	2.52
Perceived adverse impacts of climate change – *Sea-level rises* **(PI-SEA)**	-.10	-1.22	1.45	.07	.90	1.45
Perceived Effectiveness – *Behavioural policies* **(PE-BEH)**	.63	5.55***	2.72	-.25	-2.18*	2.72
Perceived Effectiveness – *Structural policies* **(PE-STR)**	-.25	-2.26*	2.67	.71	6.30***	2.67
Perceived Feasibility – *Behavioural policies* **(PF-BEH)**	.19	2.30*	1.40	.01	.09	1.40
Perceived Feasibility – *Structural policies* **(PF-STR)**	-.15	-1.89	1.43	.00	.02	1.43

[a] Standardised coefficients

[b] *$p < .05$, **$p < .01$, ***$p < .001$, all are two-tailed tests

(VIFs under 5.0 indicate insignificant multi-colinearity issues (Hair 2010))

Appendix 3: Demographics - The general public sample

Gender	Frequency	Percent	Cumulative Percent
Male	882	59.8	59.8
Female	594	40.2	100.0
Total	1,476	100.0	

Age	Frequency	Percent	Cumulative Percent
Under 19	9	.6	.6
From 20 to 29	115	7.8	8.4
From 30 to 39	257	17.4	25.8
From 40 to 49	278	18.8	44.6
From 50 to 59	391	26.5	71.1
From 60 to 69	321	21.7	92.9
Above 70	105	7.1	100.0
Total	1,476	100.0	

Education	Frequency	Percent	Cumulative Percent
Primary school	17	1.2	1.2
Undergraduate	196	13.3	14.4
Secondary school	513	34.8	49.2
Postgraduate and higher	451	30.6	79.7
Vocational training	236	16.0	95.7
Other	63	4.3	100.0
Total	1,476	100.0	

Political Affiliation	Frequency	Percent	Cumulative Percent
Labor Party	611	41.4	41.4
Liberal Party	424	28.7	70.1
National Party	32	2.2	72.3
Green Party	141	9.6	81.8
Independent	107	7.2	89.1
Other	161	10.9	100.0
Total	1,476	100.0	

Employment	Frequency	Percent	Cumulative Percent
Paid full time employment	534	36.2	36.2
Paid part time employment	240	16.3	52.4
Not in paid workforce	237	16.1	68.5
Retired	366	24.8	93.3
Other	99	6.7	100.0
Total	1,476	100.0	

Income	Frequency	Percent	Cumulative Percent
Less than $50,000 per year	531	36.0	36.0
Between $50,000 and $99,999 per year	454	30.8	66.7
Between $100,000 and $149,999 per year	210	14.2	81.0
Between $150,000 and $199,999 per year	62	4.2	85.2
More than $200,000 per year	34	2.3	87.5
Prefer not to say	185	12.5	100.0
Total	1,476	100.0	

Appendix 4: Demographics - The climate scientist sample

Gender	Frequency	Percent	Cumulative Percent
Male	101	72.1	72.1
Female	39	27.9	100.0
Total	140	100.0	

Age	Frequency	Percent	Cumulative Percent
From 30 to 39	28	20.0	20.0
From 40 to 49	47	33.6	53.6
From 50 to 59	43	30.7	84.3
From 60 to 69	20	14.3	98.6
Above 70	2	1.4	100.0
Total	140	100.0	

State	Frequency	Percent	Cumulative Percent
Australian Capital Territory	15	10.7	10.7
New South Wales	36	25.7	36.4
Victoria	29	20.7	57.1
Queensland	35	25.0	82.1
South Australia	7	5.0	87.1
Western Australia	11	7.9	95.0
Tasmania	7	5.0	100.0
Total	140	100.0	

Field of Expertise	Frequency	Percent	Cumulative Percent
Physical sciences	59	42.1	42.1
Social sciences	41	29.3	71.4
Other (Please specify)	40	28.6	100.0
Total	140	100.0	

Appendix 5: Questionnaire's main content

Q1. Do you think that global climate change has occurred over the **past five years**?

Yes	No
☐	☐

Q2. Do you think global climate change is likely to occur over the next five years?

Yes	No
☐	☐

Q3. To what extent do you think the climate change that occurred over the **past five years** has been induced by human activities, and to what extent is it a factor of natural causes?

Exclusively due to natural causes	Mainly due to natural causes	Fairly equal combination of both	Mainly due to human activities	Exclusively due to human activities	I have no idea
☐	☐	☐	☐	☐	☐

Q4. To what extent do you think climate change has been a cause of the following possible outcomes over the **past five years**?

	Not at all	Slightly	Moderately	Considerably	Totally	I have no idea
Changing weather patterns	☐	☐	☐	☐	☐	☐
Floods	☐	☐	☐	☐	☐	☐
Drought	☐	☐	☐	☐	☐	☐
Biodiversity decreases	☐	☐	☐	☐	☐	☐
Community health problems	☐	☐	☐	☐	☐	☐
Reduced personal income	☐	☐	☐	☐	☐	☐
Reduced food production	☐	☐	☐	☐	☐	☐
Rise in sea levels	☐	☐	☐	☐	☐	☐
Reduced availability of fresh water for drinking and farming	☐	☐	☐	☐	☐	☐

Q5. Given current trends, to what extent do you think that climate change will be a cause of any of the following possible outcomes over the **next five years**?

	Not at all	**Slightly**	**Moderately**	**Considerably**	**Totally**	**I have no idea**
Changing weather patterns	☐	☐	☐	☐	☐	☐
Floods	☐	☐	☐	☐	☐	☐
Drought	☐	☐	☐	☐	☐	☐
Biodiversity decreases	☐	☐	☐	☐	☐	☐
Community health problems	☐	☐	☐	☐	☐	☐
Reduced personal income	☐	☐	☐	☐	☐	☐
Reduced food production	☐	☐	☐	☐	☐	☐
Rise in sea levels	☐	☐	☐	☐	☐	☐
Reduced availability of fresh water for drinking and farming	☐	☐	☐	☐	☐	☐

Q6. How effective do you think that the actions and policies below could be in helping to prevent global climate change?

	Not at all effective	**Slightly effective**	**Moderately effective**	**Very effective**	**Totally effective**	**I have no idea**
Government subsidies for more energy efficient household equipment	☐	☐	☐	☐	☐	☐
Government subsidies for more energy efficient business equipment	☐	☐	☐	☐	☐	☐
Government Support for a Cap and Trade or Emissions Trading system	☐	☐	☐	☐	☐	☐
Increased investment in renewable energy	☐	☐	☐	☐	☐	☐
International standards for more energy efficient products	☐	☐	☐	☐	☐	☐
Introduction of a carbon tax	☐	☐	☐	☐	☐	☐
Education about actions to reduce climate change	☐	☐	☐	☐	☐	☐
A self regulatory carbon usage scheme managed by business groups	☐	☐	☐	☐	☐	☐
Improvements in public transport	☐	☐	☐	☐	☐	☐
Investment in fuel efficient vehicles	☐	☐	☐	☐	☐	☐

Q7. How difficult do you think it would be to get action undertaken on each of the following possible activities?

	Not at all difficult	Slightly difficult	Moderately difficult	Very difficult	Totally difficult	Don't know
Government subsidies for more energy efficient household equipment	☐	☐	☐	☐	☐	☐
Government subsidies for more energy efficient business equipment	☐	☐	☐	☐	☐	☐
Government Support for a Cap and Trade or Emissions Trading system	☐	☐	☐	☐	☐	☐
Increased investment in renewable energy	☐	☐	☐	☐	☐	☐
International standard for more energy efficient products	☐	☐	☐	☐	☐	☐
Introduction of a carbon tax	☐	☐	☐	☐	☐	☐
Education about actions to reduce climate change	☐	☐	☐	☐	☐	☐
A self regulatory carbon usage scheme managed by business groups	☐	☐	☐	☐	☐	☐
Improvements in public transport	☐	☐	☐	☐	☐	☐
Investment in fuel efficient vehicles	☐	☐	☐	☐	☐	☐

Q8. We are interested in your level of support for possible actions proposed to combat climate change. To what extent do you support the following activities?

	Totally oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Totally support	Don't know
Government subsidies for more energy efficient household equipment	☐	☐	☐	☐	☐	☐
Government subsidies for more energy efficient business equipment	☐	☐	☐	☐	☐	☐
Government Support for a Cap and Trade or Emissions Trading system	☐	☐	☐	☐	☐	☐
Increased investment in renewable energy	☐	☐	☐	☐	☐	☐
International standard for more energy efficient products	☐	☐	☐	☐	☐	☐
Introduction of a carbon tax	☐	☐	☐	☐	☐	☐
Education about actions to reduce climate change	☐	☐	☐	☐	☐	☐
self regulatory carbon usage scheme managed by business groups	☐	☐	☐	☐	☐	☐
Improvements in public transport	☐	☐	☐	☐	☐	☐
Investment in more fuel efficient vehicles	☐	☐	☐	☐	☐	☐

Q9. What is you residential postcode? _____

Q10. What age group do you belong to?

☐ Under 19 ☐ From 20 to 29 ☐ From 30 to 39 ☐ From 40 to 49

☐ From 50 to 59 ☐ From 60 to 69 ☐ Above 70

Q11. What is your gender?

☐ Male ☐ Female

Q12. What is your current employment status?

- ☐ Paid full time employment
- ☐ Paid part time employment
- ☐ Not in paid workforce
- ☐ Retired
- ☐ Other

Q13. What is the highest level of education you have achieved?

☐ Primary school
☐ Secondary school
☐ Vocational training
☐ Undergraduate
☐ Postgraduate and higher
☐ Other:_____

Q14. What party did you vote for in the last Federal election?

☐ Labour Party ☐ Liberal Party ☐ National Party
☐ Green Party ☐ Independent ☐ Other: _____

Q15. Which group best describes your household income per year?

☐ Less than $50,000 per year
☐ Between $50,000 and $99,999 per year
☐ Between $100,000 and $149,999 per year
☐ Between $150,000 and $199,999 per year
☐ More than $200,000 per year
☐ Prefer not to say

If you would like to receive a copy of the survey results please click on the following email address link (or copy and paste into your email program) and provide your email address. Thank you for participating in our survey!